NETWORK WORLD

The Newsweekly of User Networking Strategies

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Early users praise LAN superservers

By Tom Smith
Senior Writer

Pioneering users of local-area network superservers say these next-generation hardware platforms have provided major cost/performance advantages over mainframes, minicomputers and other systems they replaced.

Users have deployed superservers from companies such as Compaq Computer Corp. and NetFRAME Systems, Inc. as traditional LAN servers and as multiuser systems supporting attached terminals. They say the machines are well-suited for both environments.

Superservers are a new breed of servers characterized by multiple CPUs, high-performance disk and I/O systems, and mainframe-type storage capacity.

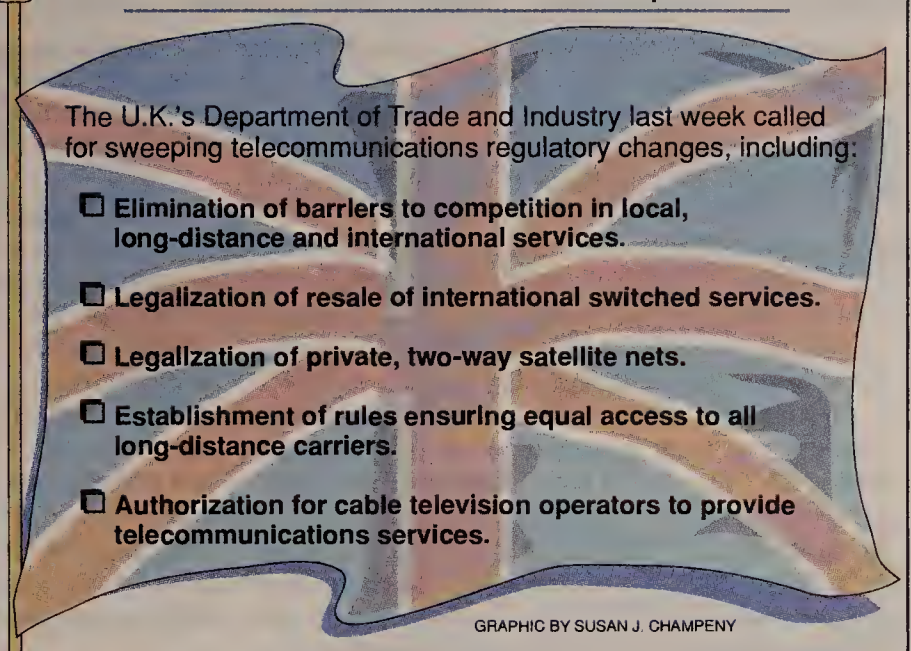
In one of the most dramatic examples of the benefits provided by superservers, Dyncorp of Reston, Va., is replacing two IBM mainframes and six IBM System/36 minicomputers with Compaq SystemPros.

The company has already installed six SystemPros and has more on order. The computers cost between $14,000 and $30,000 each.

The SystemPros will save the firm an estimated $1.5 million

(continued on page 68)

U.K. moves toward full competition



GRAPHIC BY SUSAN J. CHAMPENY

U.K. plans for wide-open telecommunications arena

Government mulls major rewrite of regulations.

By Barton Crockett
Senior Editor

LONDON — The British government last week said it wants to open its telecommunications markets to full competition, a move that could bring lower prices and new service options to international network users.

In a position paper released here, the U.K.'s Department of Trade and Industry called for the elimination of all regulations constraining competition in local, long-distance and international services.

The department also proposed the legalization of international service resale and private, two-way satellite nets.

In addition, the agency called for the establishment of equal access rules to benefit new long-distance competitors and said cable television companies — including those owned by U.S. telephone companies — should be able to sell telephone services.

The changes, which are expected to be adopted by the government early next year, would establish the U.K. as one of the most progressive regulatory environments in the world and would represent a radical depar-

(continued on page 71)

AT&T sets stage for switched T-1 service

Will file tariff in March for Accunet Switched 1536 service, expects rollout in 100 cities by late May.

By Bob Wallace
Senior Editor

BASKING RIDGE, N.J. — AT&T last week said it will file a tariff for a switched 1.536M bit/sec digital data service, which far exceeds the speeds supported by its current switched data offerings.

With AT&T's planned Accunet Switched 1536 service, users will be able to establish a dial-up T-1 link to support applications such as videoconferencing, bulk file transfers, imaging and backup for high-capacity dedicated circuits. The service complements the carrier's existing Accunet Switched 56, Switched 64 and Switched 384 services.

AT&T said it will file a tariff for Accunet Switched 1536 service in March and expects to make the offering available in more than 100 cities by late May. AT&T will list pricing and service locations in its tariff filing. Accunet Switched 1536 will be available as a stand-alone service and as an option through AT&T's Software-Defined Data Network in mid-1992.

According to Walter Suski, Accunet Switched Digital Services product manager for AT&T, the new service will cost 16 to 18 times more than a switched 64K bit/sec link, which costs 8 to 30 cents per minute, while providing 24 times the capacity.

Analysts applauded the announcement, citing growing user

(continued on page 66)

One-site virtual nets gain steam

Virtual net rates dip below WATS

Minutes per month	MCI Vnet	MCI Prism 1
200,000	$25,300	$23,400
300,000	$37,000	$35,100
400,000	$46,800	$46,700
500,000	$57,800	$58,500
750,000	$86,000	$87,800
1,000,000	$110,000	$117,000
2,000,000	$216,500	$233,000

Figures are based on average national daytime traffic distribution and rates under maximum term plans.

See story, page 2.

SOURCE: TELECHOICE, INC., MONTCLAIR, N.J.
GRAPHIC BY SUSAN J. CHAMPENY

NETLINE

VIRTUAL NET services are no longer the bastion of only the largest users. Page 2.

CAREFUL PLANNING is a must if CIM nets are to offer companies a competitive advantage. Page 2.

MCI REORGANIZES and lays off 1,500 workers in an effort to become more customer-responsive. Page 2.

AMERICAN AIRLINES plans to merge its SABRE reservation network with Europe's Amadeus net. Page 6.

UNISYS ADDS low-end offering, first T-1 interface module for DCP processor line. Page 6.

IBM, MICROSOFT ASSESS their progress in merging their LAN Server and LAN Manager products. Page 66.

NEWSPAPER

FEATURE

ISDN CPE availability lags behind expectations

By Edwin Mier
Special to Network World

Even allowing for the normal hype of announcements supporting new technology, the pace at which usable equipment has appeared for Integrated Services Digital Networks has been surprisingly slow.

In fact, just when products were expected to explode into the marketplace, it seems that a lull has settled over the nascent ISDN equipment industry.

Although they said they would, few manufacturers have entered the ISDN customer premises equipment marketplace during the past few years. Indeed, vendors that had already announced ISDN customer premises equipment have been unusually silent about unveiling major additions or enhance-

(continued on page 38)

FCC divided on handling of Tariff 12

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — While FCC officials want to move quickly to resolve the major legal questions surrounding Tariff 12, sources inside the agency told *Network World* last week an internal battle has erupted over how to handle the case.

Sources said a large faction within the commission wants to deal with the Tariff 12 issue as quickly and narrowly as possible. That could be accomplished by limiting the court-ordered reinvestigation to the first few Tariff 12 deals.

Only five Tariff 12 deals — four Virtual Terminal Network

(continued on page 71)

Virtual net providers shift target to low end of mart

Carriers marketing services even to single-site customers that spend as little as $20,000 a month.

By Bob Wallace
Senior Editor

Once sold only to large corporations with heavy intracompany calling volumes, virtual network services are now being pitched to single-site users that spend as little as $20,000 a month on outbound long distance.

The change, a culmination in the evolution of software-defined nets, coincides with the reduction or elimination of on-net traffic requirements and is resulting in an exodus from WATS services.

Although a number of large multisite WATS users have already migrated to virtual nets ("WATS eclipsed as virtual net service star ascends," *NW,* Oct. 22), even one-site WATS users are now converting because the services are cheaper and carry larger volume discounts

"We expect to save about $200,000 annually by replacing US Sprint's UltraWATS service with a single-site MCI [Vnet]," said Deborah Decker, telecommunications manager for Opryland USA, Inc. in Nashville. "We'll qualify for a 21% discount based on our annual traffic volume." Opryland signed its three-year, $5 million contract with MCI last month.

With single-site virtual networks, companies use typical virtual net authorization codes and

(continued on page 70)

CIM projects stumble over organizational roadblocks

'Cultural revolution' needed for success of CIM.

By Wayne Eckerson
Senior Editor

DETROIT — While senior executives recognize that computer-integrated manufacturing (CIM) is critical for achieving a competitive advantage in the global market of the 1990s, many CIM projects have fallen short of expectations.

CIM involves building networks to provide transparent exchange of information between a variety of incompatible factory computer systems — from shop floor controllers to hosts — as well as between suppliers and customers to support processes such as just-in-time and quick response.

Many CIM projects have been torpedoed by strategic and organizational issues rather than technology snafus, according to users and consultants attending Autofact '90 here last week.

Network managers who embark on CIM projects often underestimate the organizational barriers and the amount of training workers need, attendees said. Others have failed to consider corporate strategy and objectives when developing CIM architectures or have automated inefficient processes.

"CIM requires a cultural revolution to really work," said Clyde Rutherford, manager of comput-

(continued on page 66)

MCI will trim 1,500 jobs in major reorganization

By Bob Brown
Senior Editor

WASHINGTON, D.C. — MCI Communications Corp. last week announced a major reorganization, including plans to dismiss 1,500 workers, in an effort to cut costs and make the company more responsive to customer demands and stiff competition.

Under the reorganization, MCI will fold its seven regional service divisions — which were responsible for both business and residential services — in favor of the new Business Markets group, Consumer Markets unit and Network Services group.

The Business Markets unit will comprise four regional divisions — Eastern, Southern, Central and Western — that market business-class services. It will be headed by Kevin Sharer, previously vice-president of marketing.

The Consumer Markets group will focus on residential-class services.

MCI said the Network Services unit will enable marketing personnel to work more closely with internal network engineers to meet service demands from both business and residential customers.

"Essentially, this moves the

(continued on page 70)

Briefs

NIST drafts ISDN security plan. Researchers at the National Institute of Standards and Technology (NIST) last week completed the ISDN Security Framework, a draft document it developed in collaboration with the National Security Agency. The draft, although not publicly available, addresses Integrated Services Digital Network security issues, such as vulnerabilities associated with Signaling System 7. NIST officials said they will use the document to suggest ISDN security standards to international standards organizations.

Kangaroo connection. Attendees at a Merit Network, Inc. seminar in Ann Arbor, Mich., last week participated in an electronic press conference in which electronic mail messages traversed 11,000 miles, hopping seven networks in two hemispheres within two seconds. The E-mail messages originated from the World Solar Challenge car race in the Northern Territory of Australia.

In Australia, Merit faculty advisor Gene Smith, who was reporting the results of the University of Michigan's entry in the race, used a portable computer to dial up a connection to a mainframe at Northern Territory University in Darwin, Australia. From there, the messages traveled through the Australian Academic and Research Network, which connects to the Pacific Communications Network in Hawaii. Then they moved to the NASA Science Network, which passed them on to the Bay Area Regional Research Network in Palo Alto, Calif., which routed the data onto the National Science Foundation Network (NSFNET). From NSFNET, the messages entered MichNet, which is the Michigan Regional Network, and then the University of Michigan's UMNet.

It ain't over till it's over. AT&T last week agreed to extend to the end of the year its offer to purchase Western Union Corp.'s Business Services unit, including the EasyLink electronic messaging service, for $180 million.

The extension coincided with a last-ditch effort by Western Union to stave off a bankruptcy filing by convincing bondholders to accept newly issued Western Union stock and bonds in exchange for older Western Union stock by Nov. 28 — a transaction that must occur before the AT&T deal can go through. If this is not accepted by bondholders, Western Union will resort to making a cash tender offer for the outstanding bondholder notes.

Teleport to offer Dallas bypass net. Teleport Communications Group's Teleport Communications, Inc. subsidiary last week detailed plans to construct a 10-mile fiber-optic bypass network in Dallas. Teleport will offer 64K bit/sec restricted, 64K bit/sec clear channel, T-1 and T-3 services beginning early next year. The network, which Teleport is scheduled to begin constructing by year end, will offer users an alternative to Southwestern Bell Telephone Co.'s local access service.

Covia picks ex-Apple exec as CEO. Covia last week said it has named Allan Loren president and chief executive officer of the company. Covia runs the Apollo travel reservation system, which serves United Air Lines, Inc. as well as several foreign airlines.

Loren replaces Barry Kotar, who resigned last July. Loren, who was formerly head of marketing and sales at Apple Computer, Inc., resigned from Apple's U.S. division in January during a management shake-up to spur sluggish sales. He also spent 16 years with Cigna Corp., where he was president and chief information officer.

US Sprint, Visa ink calling card pact. Visa International, Inc. and Sprint International have teamed up to provide a service that enables overseas Visa cardholders visiting the U.S. to make long-distance calls over the US Sprint Communications Co. network. Under the plan, which is expected to begin early next year, US Sprint will provide monthly itemized billing to Visa.

Sprint International is a unit of US Sprint.

COS falls short. At last week's Corporation for Open Systems International (COS) Board of Directors meeting, officers reported that the group's membership dues fell short of plan. COS said its actual annual revenue as of October was $5.48 million off from the anticipated 1990 income of $6.09 million. As a result, COS expects to end the year with a projected loss of about $100,000. Although the organization had an increase of 11 user members, it did not add the higher paying corporate senior members it had expected.

CONTENTS

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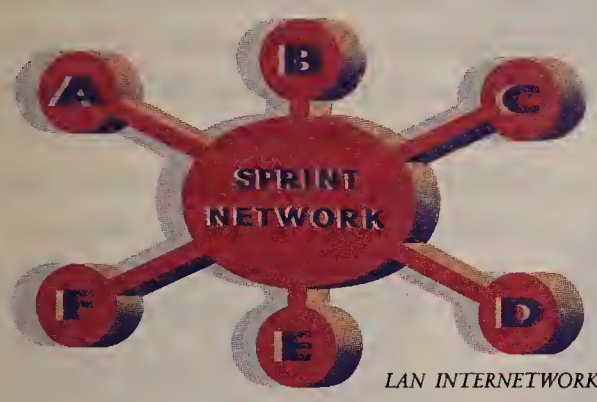

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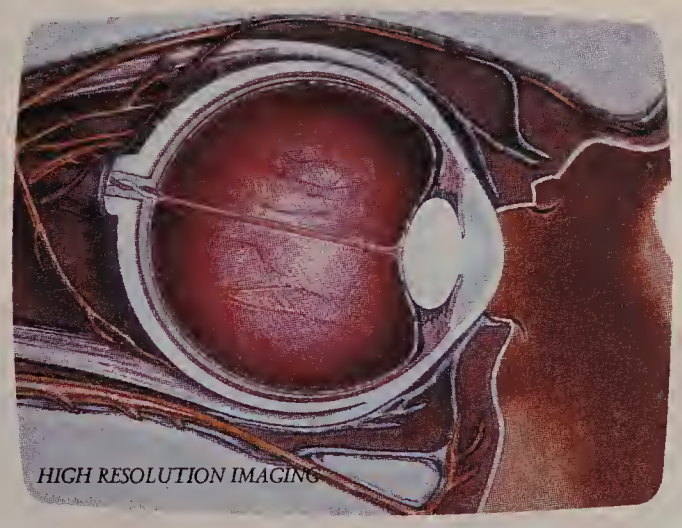

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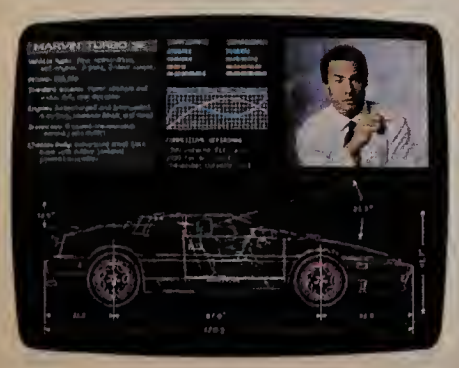
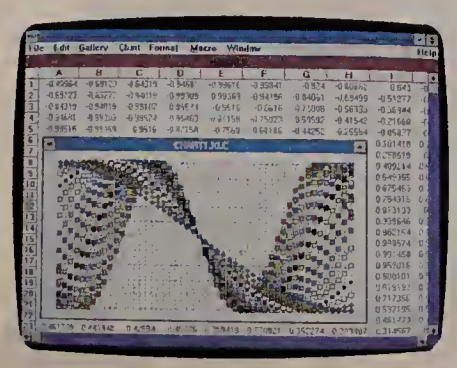


ISDN/VPN INTERNETWORKING



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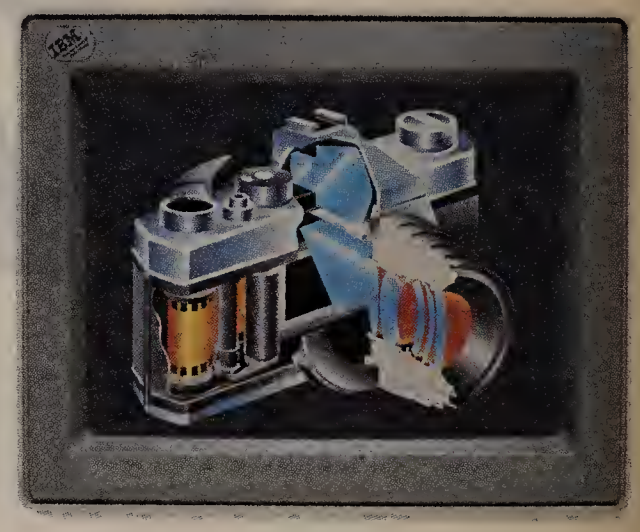

THE 90'S ARE A POWERFUL BREED.

Right out of the starting gate, the Models 90 and 95 will astound you with their power and sophistication. Featuring a 33 MHz processor and a 25 MHz processor that's easily upgraded to 33 MHz, they deliver blazing speed and balanced performance, expanding your capacity for computer-intensive applications like CAD/CAM, financial modeling and multimedia. The course between your data and your processing has also been strengthened—the Micro Channel™ 32-bit data path, combined with a lightning-quick data-transfer rate, not only optimizes the present power of the 486 processor by feeding it a steady stream of information, but also provides for processor enhancements and will allow you to benefit from advanced operating systems to come. Plus these other innovations: a wider 64-bit data path which optimizes the 486 processor's access to system memory; 4MB memory standard (expandable to 32MB); and a 256KB cache option for even greater speed. All in all, it's easy to see how the concept of computer "power" has been enhanced, and how IBM helps you take full advantage of every second of computing time.

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With increased power comes increased capabilities—the most visually stunning of which is Extended Graphics Array (XGA), standard on the PS/2 Models 90 and 95, and the heart of IBM's spectacular new display presentation.

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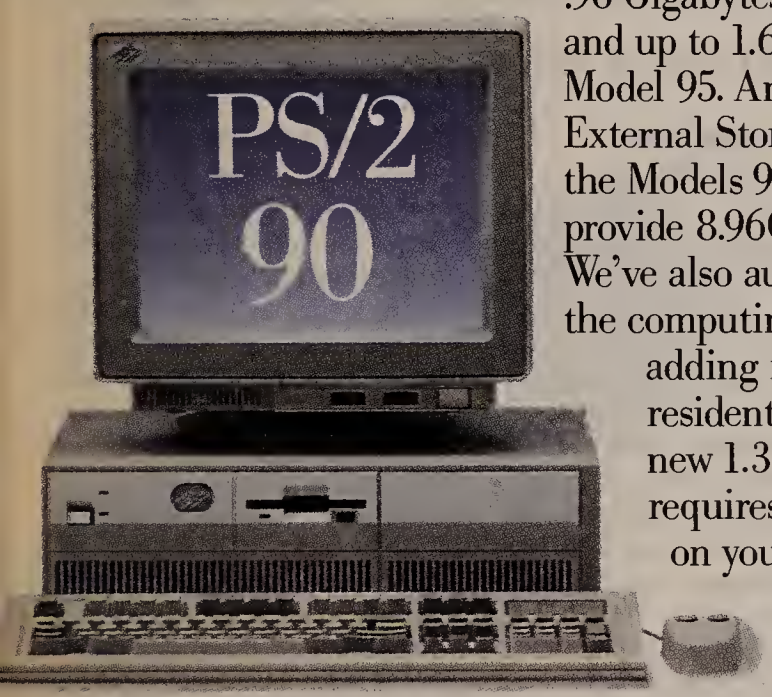

Features	IBM PS/2 Model 90	IBM PS/2 Model 95
Microprocessor		
Standard	80486	80486
Clock speed	25-33 MHZ	25-33 MHZ
Optional upgrade	33 MHZ	33 MHZ
Memory		
Standard	4MB (70ns)	4MB (70ns)
Maximum	32MB	32MB
Integrated Functions	Extended Graphics Array (XGA) and display port, dual DMA serial ports, DMA parallel port, pointing device port, keyboard port, diskette controller support for three drives, SCSI adapter with Cache.	
Fixed Disk Storage		
Standard	80-320MB	160MB-320MB
Display Modes		
APA Modes	XGA (includes all VGA modes) 640 x 480 x 256 colors/ 64 gray shades; 1024 x 768 x 16 colors/gray shades; hardware support for 132 column text mode; 16-bit direct color mode at 640 x 480 x 64K colors	
Available Expansion Slots	three 32-bit	six 32-bit
Bus Architecture		
Data path	MCA 32-bit	MCA 32-bit

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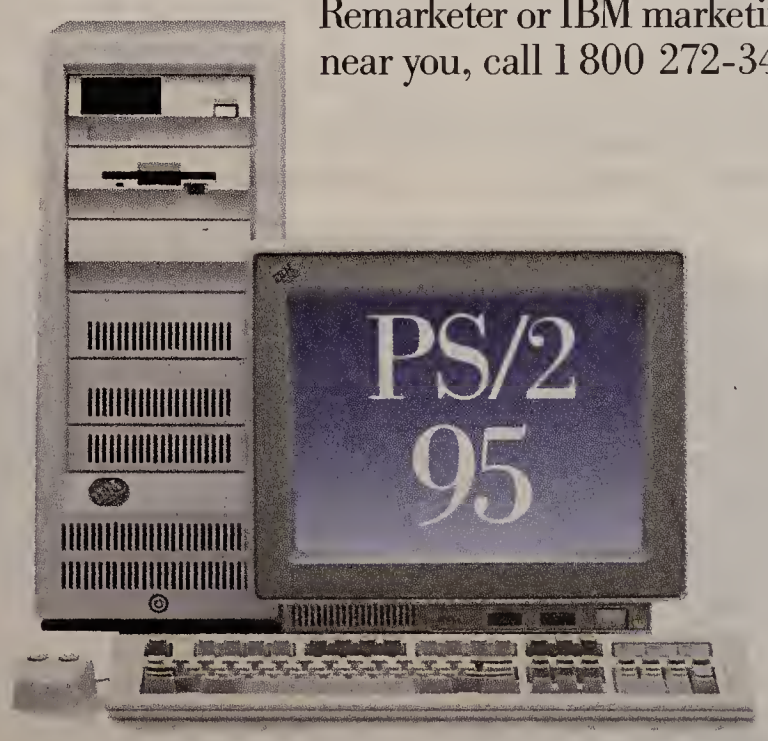

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American Airlines soars into European travel mart

Will merge SABRE with Amadeus reservation net.

By Maureen Molloy
Staff Writer

PARIS — American Airlines, Inc. last week said it will merge its SABRE travel reservation network with Amadeus, a pan-European reservation net founded by a consortium of European airlines.

American said it purchased a 10% equity stake in Amadeus, which is shared equally among Air France, Iberia Air Lines of Spain, Lufthansa German Airlines and Scandinavian Airlines System. Amadeus also agreed not to market reservation services in South America, where American recently acquired many routes.

"It's a win-win combination," said Stephen Arsenault, director at SH&E, a transportation consulting firm in New York. "Amadeus has teamed up with the best, and I'm certain the two together will make tremendous inroads in the European market."

The merger, which will create the largest international travel reservation service, will further American's strategic goal of shaping SABRE into a global computer network. The SABRE network currently juggles more than 45 million air fare combinations for more than 280 airlines, but it commands less than 15% of the European market.

In turn, Amadeus' access to the SABRE system will significantly boost the sale of its service to European travel agents, observers predicted.

The agreement will give SABRE and Amadeus users access to both networks' data bases, which contain flight schedules, hotel availability and, in Europe, access to extensive rail schedules. While American had some access to these facilities previously, the Amadeus agreement will significantly broaden SABRE's reach.

Under the agreement, Amadeus and SABRE will offer joint reservation services worldwide to travel agents and others in the industry. Both networks will have travel agents use SABRE software to access data bases on host computers, although Amadeus will continue to support the System One Corp. software it currently uses, said John Watson, network manager at Amadeus.

The 41,000 terminals connected to Amadeus will be able to access SABRE data bases via a link between the two networks' data centers. Similarly, SABRE's 85,000 users will be able to access Amadeus facilities through SABRE's central site.

The agreement is expected to take effect by early next year.

According to Earl Gaskins, vice-president of Provident Capital Management, a financial management firm in Philadelphia, Amadeus would eventually have faltered in the European market had it not aligned itself with a major U.S. airline system.

"I think Amadeus finally faced reality and knew they couldn't compete successfully without an American presence," said Gaskins.

Galileo, Amadeus' chief European rival, has benefited from its relationship with Covia Corp., one of its primary shareholders and the reservations network provider for United Air Lines, Inc. Gaskins said Amadeus' decision to hook up with SABRE would likely erase the lead currently claimed by Galileo.

Unisys intros new model, T-1 interface for DCP line

BLUE BELL, Pa. — Unisys Corp. last week announced a new low-end member of its Distributed Communications Processor (DCP) family and its first T-1 interface module for the DCP line.

Replacing the DCP/15 as the entry-level model, the DCP/25 offers approximately twice the transaction processing speed of the earlier device and 66% of the performance of the next larger machine in the line, the DCP/30.

In Unisys or multivendor environments, Unisys' DCP products can be configured as front-end processors, remote concentrators or nodal processors.

In multivendor environments, the DCPs are compliant with the first four layers of the Open Systems Interconnection network model and can concurrently support Unisys and IBM's Systems Network Architecture protocols, as well as the Transmission Control Protocol/Internet Protocol.

When supporting Unisys' Universal Terminal System (UTS) protocol in a pure Unisys Distributed Communications Architecture network, the DCP/25 can process 25 to 30 transactions per second, according to Susan Yamada, program development manager for DCP hardware. UTS is a terminal protocol similar to IBM's 3270.

A basic DCP/25 can accommodate as many as seven Intelligent Line Modules (ILM), but adding a second I/O Module (IOM) provides capacity for an additional 16 ILMs. Main memory can be expanded from 4M to 8M bytes.

Unisys offers a wide range of multiport ILMs, including an eight-port interface that will enable the DCP/25 to accommodate a maximum of 184 lines. Other available ILM interfaces include RS-232-C and RS-232-D, V.24, V.35/V.36 and 802.3 Ethernet.

(continued on page 66)

Virtual private data nets to augment, not supplant

By Bob Brown
Senior Editor

The heralded migration of voice traffic from private networks to virtual nets isn't likely to be replicated with data traffic anytime soon, despite the advent of virtual private data nets, according to industry watchers.

Virtual private data nets, such as AT&T's Software-Defined Data Network (SDDN) offering and other high-speed switched digital services, such as MCI Communications Corp.'s forthcoming switched T-1 and T-3 Virtual Private Data Services, will be cost-effective, flexible and feature-rich alternatives to private lines for certain data communications applications.

But these new digital services will be used mainly to complement existing private nets, not to replace them, observers said. Virtual services will probably be employed either as backup facilities or to support emerging applications such as imaging and videoconferencing, where the links operate less than four hours a day.

But users may be reluctant to employ the services for even these applications.

"The fundamental problem is that carriers don't understand users' requirements for data," said Rosemary Cochran, a principal at Vertical Systems Group, a Dedham, Mass., market research and consulting firm. "The things needed for data, like bandwidth management, intelligent routing of protocols and network management, just haven't been implemented in such a way that you can take traffic off a private network and put it onto a public network."

Howard Maroney, corporate vice-president of communications planning at New York Life Insurance Co. in New York, said his biggest concern about moving data from his company's private net to a virtual data network is the reliability of the software used by the carrier to control the network.

"Our leased lines are basically hard-wired, and if one goes down, we may lose a site," Ma-

(continued on page 70)

NCR adds wide-area net support to LAN Manager

Enables LANs to communicate via X.25, SNA.

By Tom Smith
Senior Writer

LAS VEGAS — NCR Corp. last week announced software that enables local-area networks running NCR's version of OS/2 LAN Manager to communicate over X.25 and IBM Systems Network Architecture wide-area networks.

NCR Communications Server 1.0 is a client/server application with components running on the LAN server and each node that requires wide-area communications. The client component, which runs on DOS and OS/2 workstations, provides the user interface, while the server portion handles WAN protocol processing.

The software works with NCR's new Multi-Protocol Communications Adapters, which provide the server with a physical connection to an SNA or X.25 line at speeds up to 19.2K bit/sec.

These adapters cost $695 for personal computer based on the Micro Channel Architecture and $1,595 for microcomputers based on the Industry Standard Architecture.

The software also works with the company's ISDN PC Terminal Adapter, which supports a single Integrated Services Digital Network Basic Rate Interface line.

NCR Communications Server 1.0 is expected to be available before year end.

The server portion is priced

(continued on page 68)

How To Keep Your Token Ring Cabling Decision From Coming Down To The Wire.

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Worth Noting

IBM's recent formation of an outsourcing division "is seen as a strong endorsement by IBM's senior management for continued emphasis on shifting revenue sources from hardware and software sales to more diversified sources, with a healthy component of service fee revenues."

The Yankee Group
Boston

People & Positions

Cindy Andreotti, formerly **MCI Communications Corp.'s** director of large account sales in northern California, was recently named vice-president of large accounts for MCI's San Francisco-based Pacific Division. Andreotti replaces **William Gallagher,** who left MCI to pursue other interests. MCI has not named a replacement to head large account sales for the northern California region.

Retix Corp. has promoted President **Steve Frankel** to the position of chief executive officer. **Andy De Mari,** former chairman and CEO, will remain as chairman of the board.

In his new position, Frankel — who will retain his role as president — will have responsibility for the strategic direction and day-to-day operations of the company. De Mari, who founded Retix in 1985, will concentrate on developing the company's vendor alliances worldwide.

Retix, which has grown from a $1 million to a $50 million company in three years, has long anticipated the executive changes in order to plan for continued growth.

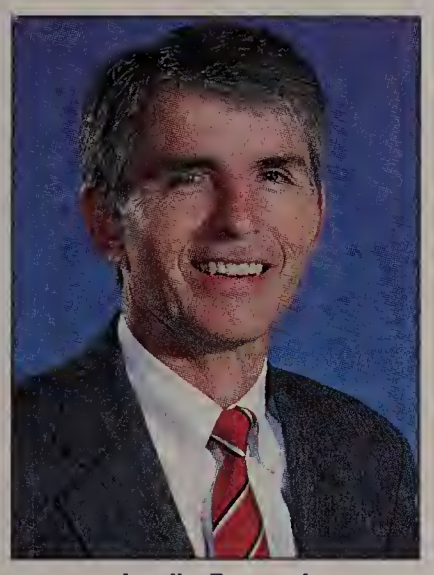
New Vitalink chief to boost customer responsiveness

Denend commits to revamp product development.

By Bob Brown
Senior Editor

FREMONT, Calif. — Leslie Denend, Vitalink Communications Corp.'s recently named chief executive officer and president, says his mission is clear: to make Vitalink more responsive to customer demand.

Denend said he is going to try to increase Vitalink's presence in the fast-growing router market, which he acknowledged Vitalink was late to enter, while maintaining the company's strengths, which include a large base of bridge customers, a 300-person work force and a healthy balance sheet.



Leslie Denend

Vitalink's product development efforts need to be improved in order to reverse "a slowness to respond to the market's acceptance of bridging and routing in a brouting context," said Denend, who previously was 3Com Corp.'s executive vice-president of product operations, including internetworking products.

"It is very clear [that Vitalink needs to address these issues] and anyone can see that," he said.

However obvious his challenge is, industry observers said, Denend will have his work cut out for him in keeping Vitalink atop the internetworking market and generating forward momentum.

Vitalink's recently reported year-end financials showed earnings down 29% to $13.3 million from $18.7 million the preceding year.

The company has also been losing ground in the overall bridge and router market to high-flying competitors such as cisco Systems, Inc., and its installed base is considered by some observers to be more vulnerable now than ever ("Vitalink expected to post soft financials," *NW,* Oct. 15).

"Vitalink lost its technology

(continued on page 11)

INDUSTRY BRIEFS

Software vendor group seeks merger. The recently formed Software Business Practices Council (SBPC) has announced plans to merge with Adapso, the computer software and services industry association. Launched on Oct. 10 with 17 founding members, the SBPC was organized to improve the integrity of the software industry by promoting ethical business practices.

According to SBPC Chairman Jeffrey Papows, SBPC determined since then that it could benefit from association with Adapso, an established organization. Several major companies — including IBM and Computer Associates, Inc. — expressed interest in joining the council but felt its goals could be achieved within the framework of Adapso, he said.

The SBPC would become a group within Adapso's Software Industry Association. The affiliation has been approved by Adapso's board but is awaiting approval by the SBPC founding members and board of directors.

US West makes cellular offer. US West, Inc. last week offered a $350 million stock swap to buy back the 19% stake in the cellular communications subsidiary it spun off to public investors in 1988.

US West, which owns 81% of US West NewVector Group, Inc., has decided to try to buy the rest of the company in order to better integrate the unit's wireless communications technologies with those being developed in other parts of US West. Previously, cellular communications had been considered a stand-alone business, US West executives said.

Squabble over PCN bandwidth reallocation

The issue: Should Personal Communications Network bandwidth be allocated on a regional or worldwide basis?

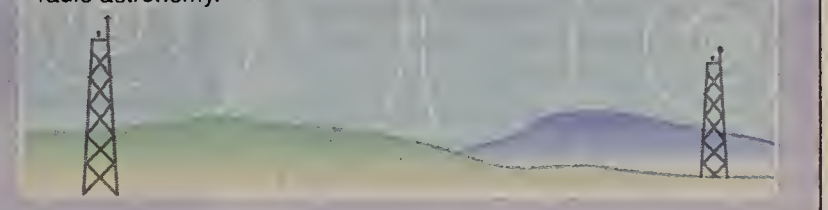
The forum: World Administrative Radio Conference '92.

Participants: Government representatives from 166 countries will meet in Spain during the first quarter of 1992 to hammer out a new agreement for radio spectrum allocation for Future Public Land Mobile Telecommunications Systems, commonly referred to as PCN.

Positions:

- ☐ European governments and Japan favor implementation of a global allocation of radio bandwidth for PCNs.
- ☐ The U.S. believes PCN bandwidth allocation should be a domestic issue.

Current allocation: In 1979, member countries allocated 1 GHz to 3 GHz worldwide for fixed microwave, broadcast auxiliary, mobile satellites, radiolocation, aeronautical telemetering and radio astronomy.



GRAPHIC BY SUSAN J. CHAMPENY

PCN spectrum issue sparks global battle

U.S. may face off against European, Japanese users in allocating 1- to 3-GHz spectrum for PCN.

By Ellen Messmer
Washington Correspondent

WASHINGTON, D.C. — A battle is shaping up between representatives from European governments and the U.S. over how to allocate radio spectrum for personal communications networks (PCN), an emerging microcell-based wireless telecommunications technology.

The conflict could indefinitely delay the availability of PCN services in the U.S, and when those services do become available, the lack of agreement over PCN spectrum allocation could force equipment manufacturers to develop separate product lines that negate any economies of scale from manufacturing to a single standard, possibly driving up prices for U.S. PCN equipment.

European countries have a definitive plan to guarantee PCN service and equipment compatibility by persuading government regulators worldwide to reserve at least 60 MHz of spectrum in the 1- to 3-GHz range to assure that users can place international PCN calls. A single agreement on international PCN spectrum allocation dovetails with plans for a unified Europe in 1992.

However, officials at the U.S. Department of State and the Federal Communications Commission — which helps draft the U.S. policy on spectrum allocation for PCNs — directly oppose such a plan because that bandwidth has been allotted to other types of communications services in the U.S., such as microwave.

State Department and FCC officials contend that bandwidth allocation is strictly a domestic issue and maintain that their position will not be compromised by an international effort to synchronize PCNs in the 1- to 3-GHz range.

"In an international frequency scheme, the U.S. is in favor of maximum possible flexibility [regarding PCN bandwidth allocation]," FCC Commissioner Alfred Sikes told attendees of a recent

State Department and FCC officials contend that bandwidth allocation is a domestic issue.

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Annenberg Foundation forum here. Industry observers said that means the U.S. will not be forced to comply with any plan for spectrum standardization proposed by European nations.

The whole issue will come to a head at the World Administrative Radio Conference (WARC) '92, which will be held in Spain in early 1992. There, representatives from 166 governments will de-

(continued on page 10)

3Com to plug hole in product line, resell SynOptics wiring hubs

Deal lets 3Com serve market now rather than invent own hubs.

By Bob Brown
Senior Editor

SANTA CLARA, Calif. — 3Com Corp. last week said it will resell SynOptics Communications, Inc.'s LattisNet System 3000 wiring hubs under an OEM agreement that plugs a gap in 3Com's product line.

The move is expected to enable 3Com to compete better with vendors such as Ungermann-Bass, Inc. that already sell wiring hubs as part of their network product lines, industry observers said.

3Com will offer the products under the LinkBuilder label for an undisclosed period of time. 3Com plans to add value to the hubs by offering bridging and routing add-on cards, and would support the System 3000s under its own management scheme.

LinkBuilder products will be available in four- and 12-port models, said John Boyle, product line manager for hubs and management products within 3Com's Network Adapter Division. The LinkBuilder hubs are designed to segment local-area net traffic and interconnect various LANs.

According to Boyle, the LinkBuilder products complement 3Com's existing adapters and internetworking and net management products by giving customers a set of network products that span from the desktop through the wiring closet to the wide-area network.

> 3Com plans to add value to the LattisNet hubs by offering bridging and routing add-on cards.
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While 3Com already offers a low-priced line of MultiConnect repeater hubs, the company did not previously offer intelligent concentrator hubs.

"Rather than recreate what a dozen or more vendors had already done in building intelligent hubs, we figured we'd leverage the proven design of SynOptics' hubs and focus on adding value in the areas where we have expertise," Boyle said.

He stressed that 3Com and SynOptics will not be competing in this market, though their distribution channels are bound to overlap at times. 3Com hopes to target some of its customers and overseas markets that SynOptics, a smaller company, would not likely reach, he added.

The two companies announced in late August they were working together to ensure interoperability between their products as well as on possible OEM and technology-sharing projects.

The LinkBuilder hubs support workstation connections via 10BaseT, thin coaxial and fiber-optic Ethernet modules. Retiming and Simple Network Management Protocol-based net management modules will also be available for hub management, as will an external fiber transceiver to tie remote devices to the hub. These are all SynOptics products that will be sold by 3Com under the OEM relationship.

3Com has not specified when it will deliver its router and bridge modules. The company is considering redesigning its existing NetBuilder internetworking products to use as modules for the LinkBuilder hubs, but 3Com has not decided how it will provide routing and bridging capabilities on LinkBuilder products, Boyle said.

Boyle added that 3Com also plans to support the hubs under its Open Management Architecture-based network management products, the first of which are due out next spring. This would let users manage the hubs and devices attached to the hubs, as well as other 3Com gear on the net, from the same management system.

The base LinkBuilder 100, a four-port chassis, will be priced at $1,995, while the 12-port LinkBuilder 500 will be priced at $4,450, both of which are roughly the same as SynOptics' prices. The network management modules will start at $5,895, and the various media modules range in price from $1,795 for an eight-port 10Base2 (thin coaxial) interface to $3,350 for a 12-port 10BaseT module.

The LinkBuilder product line is scheduled to be available next month from 3Com's worldwide network of resellers and distributors.

PCN spectrum issue sparks global battle

continued from page 9

bate the establishment of a new spectrum allocation for PCNs.

However, many governments are already formulating policy and making their intentions clear.

"The British started purging the 1,750-MHz to 2,390-MHz band as much as three years ago," said Leonard Raish, an attorney with Washington, D.C.-based Fletcher, Heald and Hildreth, which represents users in the railroad industry. The railroads, along with pipeline companies and utilities, use the 1,850- to 1,990-MHz range for private microwave transmissions.

"The Europeans are willing to purge a

segment of this band to make it available for PCN. They would like to do it on a worldwide basis," Raish said.

Satoshi Kobayashi, senior advisor for the telecommunications bureau in Japan's Ministry of Posts and Telecommunications, said the 1- to 3-GHz bandwidth portion, once crowded in Japan, has also been cleared for use by PCNs.

But in the U.S., where PCN advocates want the FCC to give them spectrum occupied by licensed private microwave users, the hard decisions have not yet been made by the FCC, which is hoping that all parties can be accommodated through the use of spread-spectrum techniques.

The FCC has authorized radio spectrum experiments that, in the next year or two, may determine to what extent spread spectrum can permit spectrum-sharing between PCN and microwave users.

Because the PCN question has not been answered in the U.S., the FCC is not prepared to advocate international PCN abroad.

"You have to know what your own views are, and this is not the case at this time," conceded Charles Rush, associate administrator for the office of international affairs at the National Telecommunications and Information Administration.

Showdown in Spain

The State Department and the FCC advocate that the U.S. try to override the European initiative to establish global PCN bandwidth. At WARC '92, the U.S. will push to retain the fixed and mobile classifications currently in place in the 1- to 3-GHz range (see graphic, page 9). But the overwhelming support for an international PCN spectrum standard in Europe has left many industry and government observers dissatisfied with the U.S. stance.

"All the action on the terrestrial mobile side is coming out of Europe, not the U.S.," said John Gilsenan, deputy director for the Office of Radio Spectrum Policy at the State Department's Bureau of International Communications and Information Policy. "We certainly aren't carrying the banner in that arena."

If attendees at WARC '92 vote in favor of global PCN spectrum allocation, the U.S. legally has the option of not accepting global PCN bandwidth as a domestic allocation, although the FCC could incorporate it at a later date.

Equipment manufacturers are holding their breath as the debate unfolds. Their equipment production decisions will hinge on knowing where bandwidth and services are allocated. Some equipment manufacturers are frustrated by the U.S. position because it may require them to develop separate incompatible product lines for regional markets.

According to Dhawal Moghe, manager of strategic marketing studies at Bell Northern Research, the research arm of Northern Telecom, Inc., the U.S. position has created uncertainty for manufacturers, whereas a global PCN allocation would produce economies of scale that would drive down manufacturing and end-user costs.

New Vitalink chief to boost responsiveness

continued from page 9

momentum [under previous management], and it will be difficult to gain that momentum back in such a fast moving technology environment," said Michel Guite, a senior vice-president at Salomon Brothers, Inc., an investment firm in New York. But "the company's chairman [Donald Herman] has already laid out a strategy for future product development. I'd say Denend is a good candidate to execute that strategy."

Denend came to Vitalink following a series of events at 3Com that made it clear that his prospects for leading 3Com were limited. After Eric Benhamou was named president and CEO of 3Com earlier this year, Denend said he realized he also wanted that kind of responsibility but would need to find it at another firm.

In coming to Vitalink, Denend is treading on familiar territory. In May 1989, he picked up responsibility for 3Com's Enterprise Systems Division, which consisted of the remnants of Bridge Communications, a company that cooperated on development of bridges with Vitalink in the mid-1980s via technology cross-licensing.

Denend's top priority is improving Vitalink's routing expertise, which he said will require a heavy investment in research and development and ongoing retraining of the company's support staff, which is accustomed to working with less complex bridging technology.

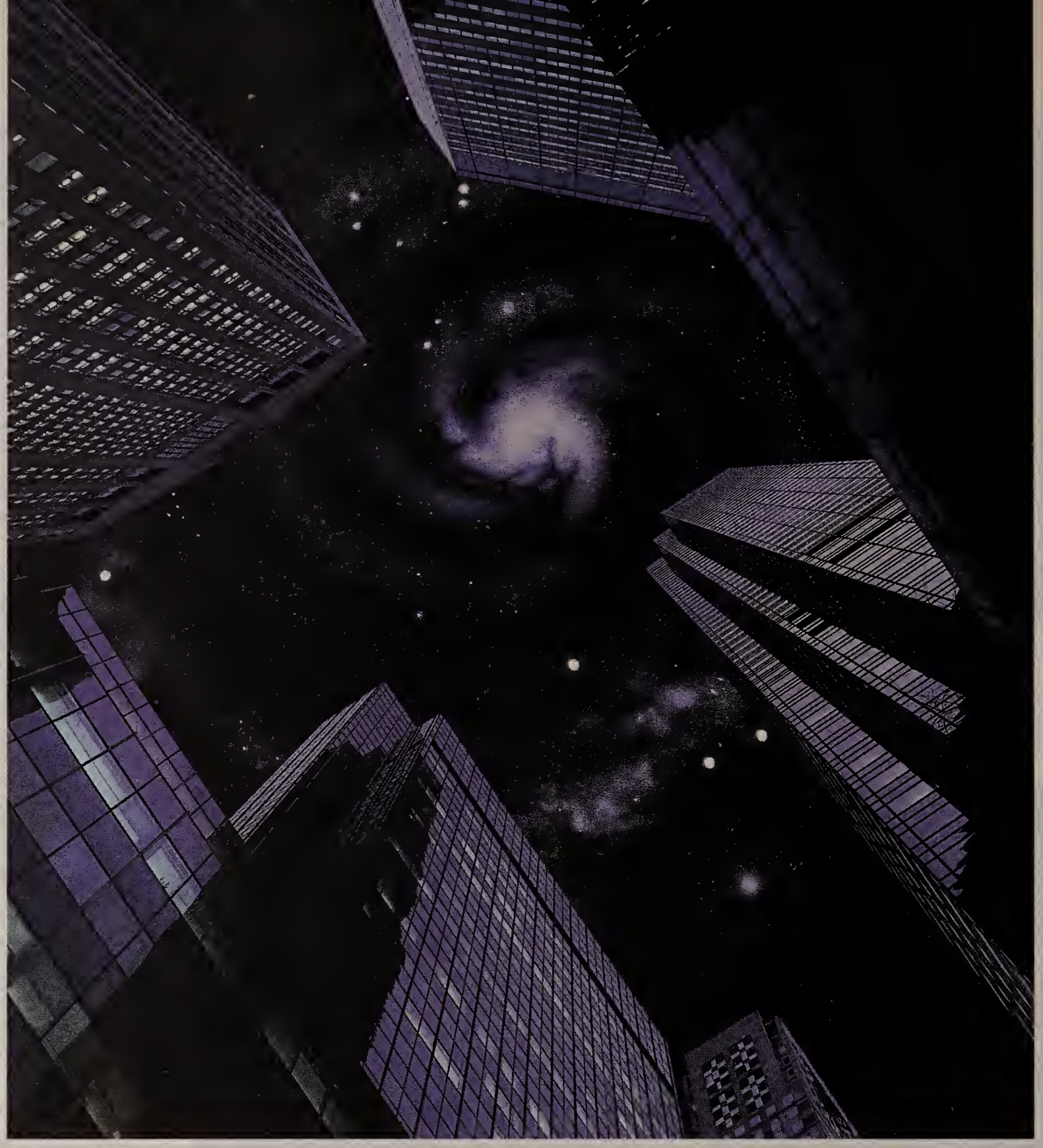
Vitalink hopes to differentiate itself in the market by ensuring total backward and forward compatibility with products, he said.

"The issue becomes one of meeting customers' expectations to preserve their investments rather than [focusing solely] on the advanced product discussion," said Denend, shrugging off the notion that Vitalink's customer base is vulnerable.

Denend offered no specifics about into what other markets he plans to lead Vitalink but suggested that both the local-area network and wide-area network markets are possibilities since Vitalink's products now fall between the two.

Denend admitted that Vitalink's momentum may have waned earlier this year. But he said the company has gotten back on track in recent months, having recently reduced its work force as a cost-cutting measure and by continuing to roll out routing enhancements under Herman's interim leadership.

"I feel as though I am jumping on a moving train that is gathering steam," Denend said.



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See The FAXNeT Form on Page 33

Worth Noting

Worldwide sales of Integrated Services Digital Network customer premises equipment will soar from $11.6 billion by year end to $21.6 billion in 1996, thanks in part to strong sales in Europe, according to a recent report by Market Intelligence Research Corp., a Mountain View, Calif., research firm.

Carrier Watch

The **National Centrex Users Group (NCUG)** recently announced a new edition of its guide to service providers, equipment vendors, software houses, systems integrators and consultants.

The NCUG Vendor Sourcebook II contains telephone numbers and addresses for these companies, contact numbers for NCUG officers and a series of articles on pressing issues for Centrex users.

The articles, which cover such topics as caller identification service and user control of Centrex, are written by newly elected NCUG President Lowell Kessler, a supervising engineer with Detroit Edison Co. in Detroit.

The free 30-page source book is available now. For more information, write to NCUG at P.O. Box 319, Novi, Mich. 48376.

Metropolitan Fiber Systems, Inc. (MFS) of Baltimore last week announced that it is providing fiber-optic bypass service to the Social Security Administration's Office of Telecommunications in Woodlawn, Md.

The Social Security Administration is using MFS service to transmit data to a local carrier point-of-presence and then on to offices in Birmingham, Ala., Chicago, Kansas City, Mo., New York, Philadelphia and San Francisco.

Agencies charge FCC with mishandling Nynex probe

N.Y. groups ask for reexamination of the case.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — The New York attorney general's office and the state's Consumer Protection Board have accused the FCC with mishandling its overcharging case against Nynex Corp. and asked the commission to reopen the investigation.

In a Nov. 5 filing, the agencies charged that the Federal Communications Commission did not uncover the full extent of the overcharging committed by Nynex. They said they had no opportunity to present evidence backing up their assertions because the FCC refused to conduct a public hearing before closing the matter.

Nynex was accused of siphoning profits from its regulated telephone companies — New England Telephone and Telegraph Co. and New York Telephone Co. — by forcing them to buy goods and services at inflated prices through a Nynex subsidiary, Materiel Enterprises Co. (MECO).

In February, the FCC said an audit had revealed that the telephone companies had passed on to customers almost $120 million in overcharges through inflated prices.

The FCC initially decided to fine Nynex $1.4 million and require the carrier to reduce rates by an amount equal to the overcharges. But to the surprise of many, the FCC in October signed a consent decree with Nynex relieving the carrier of admitting wrongdoing and allowing it to make a tax deductible $1.4 million "voluntary contribution" to the Department of the Treasury in lieu of a fine.

The consent decree also required the carrier to reduce by $35.5 million its interstate access rates — the only services over which the FCC has jurisdiction — and stipulated that the FCC give up the right to further investigate the allegations of overcharging.

In their joint filing, the two New York state agencies said the FCC must reconsider its decision to enter into the consent decree. They claimed to have evidence that the overcharges were "more extensive and had a greater effect on New York Telephone's rates than the commission believed

(continued on page 14)

WASHINGTON UPDATE

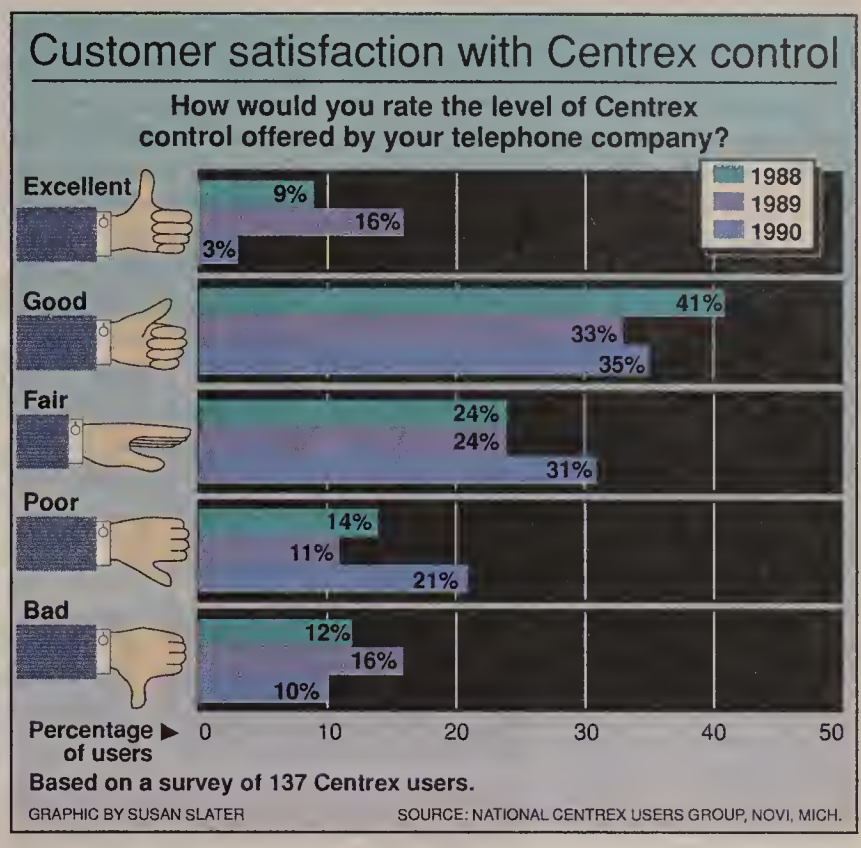
BY ANITA TAFF

FCC investigates latest Tariff 15. The last of AT&T's pending Tariff 15 deals was put on hold by the Federal Communications Commission last week to allow the agency to investigate the lawfulness of the discount plan. This latest deal would have given Deluxe Corp. a 23% discount on Software-Defined Network services and a 13.1% discount off a number of 800 service rates, including those offered under term plan Megacom 800 and Readyline 800.

The Deluxe deal was scheduled to take effect Nov. 14, but like almost all of the Tariff 15 deals preceding it, the discount package was suspended for a period of five months. The FCC is investigating the legality of offering discounts to individual customers. AT&T says its rivals offer discounts targeted at individual customers and that it must be able to do the same to compete for large users. The Deluxe deal was AT&T's response to an offer it says MCI Communications Corp. made to Deluxe.

After more than two years of wrangling with the FCC over Tariff 15 deals, AT&T is providing service under the agreement to only one customer, Resorts Condominium International, Inc. The FCC let that deal take effect but never ruled that it was lawful. Thus, even that deal could be rejected in the future.

The FCC rejected as unlawful AT&T's first Tariff 15 deal for Holiday Corp., but it did not rule that the Tariff 15 concept was illegal. AT&T has withdrawn two Tariff 15 deals, one for First Commerce Corp. and one for Rohm & Haas Co. The remaining seven offerings have all been suspended for five months while the FCC investigates them. The deadline for the FCC to rule on the lawfulness of the oldest suspended deal is late this month. However, if the FCC issues no decision by that time, the tariff will automatically take effect.



Centrex users want more control tools

Latest NCUG survey finds users seeking better net management tools, waning interest in ISDN.

By Bob Wallace
Senior Editor

SAN DIEGO — While users say they are pleased with Centrex, they want phone companies to provide more and better management tools, according to a survey released by the National Centrex Users Group (NCUG) at its recent annual conference here.

The NCUG's third annual survey also revealed that Centrex tariffs are becoming increasingly rigid and that telephone companies' efforts to resolve service and support problems are not making the grade.

"The National Centrex Users Group 1990 Customer Satisfaction Survey" results also show that fewer users are considering using Integrated Services Digital Networks than before. The group polled 950 members nationwide and received 137 responses.

According to the survey, 25% of the respondents operate systems of as many as 1,000 lines, 45% run 1,001- to 5,000-line Centrexes and 30% have systems with 5,001 lines or more.

Users were asked to rate the level of control and management they have over their Centrex service (see chart, this page).

Most of the users (62%) rated Centrex control fair, poor or bad, compared with 51% who rated the service that way in last year's survey. Thirty-eight percent rated user control excellent or good, compared with 49% last year. In 1988, users were split 50-50.

"We're still fighting for basic Centrex control and management products four years after the user group was formed," said former NCUG President Dick Jenifer, a senior telecommunications specialist with CNA Insurance, Inc. in Chicago. "Things like ISDN are a higher priority to service providers than to users."

Existing management products only enable users to perform on-line station moves, adds or changes that don't take effect until hours — and sometimes days — later. "What most Centrex users are looking for are products that make changes in real time," Jenifer said.

> "Things like ISDN are a higher priority to service providers than to users," Jenifer said.
>
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The 800-member NCUG has worked with the regional Bell holding companies to enhance the on-site terminals that enable users to access the RBHCs' service support systems to perform station moves, adds and changes.

Large Centrex users such as CNA, which has nearly 7,000 lines of digital Centrex in Chicago, want more sophisticated management products. "What we want is a product that enables us

(continued on page 14)

Agencies charge FCC mishandled probe

continued from page 13

when it adopted the consent decree."

If the FCC allows the consent decree to stand, ratepayers may never get the full refund to which they are entitled, the two agencies said. They added that the FCC has an obligation to reopen the case because it never fully explained its decision to sign the consent decree. Nynex had challenged the FCC's authority to levy fines and order refunds, and the FCC apparently wanted to avoid a protracted court battle.

At the time the FCC signed the consent decree, FCC Commissioner Andrew Barrett expressed reservations. "I reluctantly agree with my colleagues to adopt this order, [but] were I the lone commissioner, I would have adjudicated this matter to resolve the guilt or innocence of Nynex," Barrett said in a written statement.

The consent decree also raised questions about the FCC's ability to protect consumers. Roy Morris, deputy general counsel for Allnet Communications Services, Inc., said, "This is clearly an attempt to shovel the problem under the rug."

Another telecommunications attorney, who requested anonymity, agreed that the FCC's reputation is on the line and said this case could hurt the commission's efforts to extend its jurisdiction.

"If the agency is serious about getting jurisdiction over the Modified Final Judgment," he said, "it will have to be a lot more serious about regulation."

Centrex users want more control tools

continued from page 13

to dynamically route calls around [downed facilities] in the event of disasters," Jenifer said. "That would be a valuable product."

Other Centrex users echoed Jenifer's assessment. "We're not saying we want ISDN now. What we do want, however, is the ability to monitor and test Centrex lines," said Deborah Siegle, chief service director for Centex Telemanagement, Inc., a San Francisco-based firm that manages 55 Centrexes representing 60,000 lines for a variety of users.

The RBHCs have been slow to develop Centrex management products such as on-site terminals for moves, adds and changes because they don't want to lose revenues from that work, Jenifer said.

Development of Centrex management products is only one of several key areas the RBHCs need to address better, according to participants in the NCUG survey.

Users were asked to rate the flexibility of their Centrex tariffs and contracts. Flexibility was defined as the service provider's ability to offer new features, attractive pricing and term plans (see chart, this page). About 59% of the respondents said tariffs and contracts are flexible or somewhat flexible, while 41% called them inflexible or somewhat inflexible. Last year, 66% said their Centrex arrangements were flexible or partially flexible and 34% termed them inflexible or somewhat inflexible.

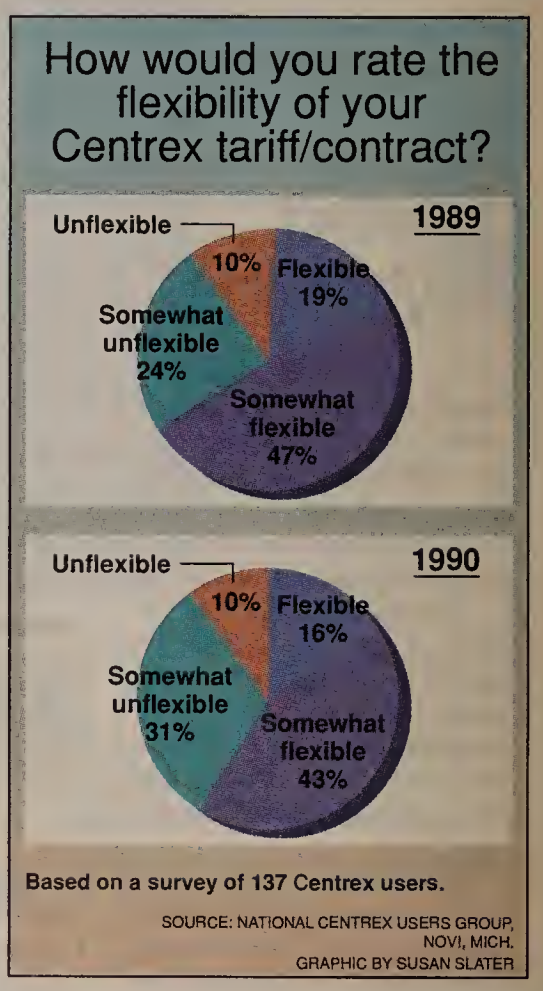
"Tariffs may always be a source of frustration for Centrex users," said newly elected NCUG President Lowell Kessler, a supervising engineer for Detroit Edison Co. in Detroit. "Centrex is, by nature, a heavily regulated service. This means that introducing new features and [reworking] pricing will continue to take a lot of time."

Working with the RBHCs is about as easy as it was a year ago, according to survey respondents. For the past two years, about 75% of the respondents have said it is very easy or somewhat easy to do business with their Centrex provider, while the remainder said it was somewhat or very difficult to work with them.

In addition, users were asked to rate action taken by their service provider to resolve Centrex problems. The percentage of satisfied users shrunk slightly in 1990. About 51% said they are totally or partially satisfied, and 9% said they are totally or partially dissatisfied. Forty percent of the respondents were undecided.

Last year, 54% said they were totally or partially satisfied and 17% were totally or partially dissatisfied. Twenty-nine percent of the respondents were undecided. In 1988, 59% of users surveyed were totally or partially satisfied, 10% were totally or partially dissatisfied and 31% were undecided.

Interestingly, NCUG member interest in ISDN continues to slide. In 1989, 54% of the respondents were considering ISDN and 46% were not. This year, 39% are considering it and 61% are not.



DATA COMMUNICATIONS

PRODUCTS, SERVICES, ARCHITECTURES, STANDARDS AND NETWORK MANAGEMENT

Worth Noting

"In the past, users had to be convinced they should move to open systems [and networks]. Today, open networks are a given, and customers are asking how and when to move to them."

David Malas
Manager
CIM Systems Integration Center
NCR Corp.
Wichita, Kan.

Data Packets

Advanced Computer Communications (ACC) last week said it is building a frame relay interface for its Series 4000 line of multiprotocol bridges and routers that is expected to ship in the first quarter of 1991. ACC said the interface will conform to CCITT's I.122 and ANSI's T1.606 frame relay specifications.

The interface will also support the Local Management Interface (LMI) specification included in a frame relay interface specification jointly published by cisco Systems, Inc., Digital Equipment Corp., Northern Telecom, Inc. and StrataCom, Inc.

The LMI extension will be offered as an option to the firm's implementation of the ANSI standard, adding a set of management features that will enable users to monitor sessions between remote networks or reconfigure networks that use frame relay.

ACC's Series 4000 products route DEC's DECnet, Novell, Inc.'s Internetwork Packet Exchange, Xerox Corp.'s Xerox Network Systems as well as Transmission Control Protocol/Internet Protocol traffic between remote networks.

The products are also capable of using a bridging function to pass traffic to remote networks by using other protocols.

(continued on page 16)

Bank programs NetView to screen help desk messages

SunTrust Banks' project helps keep staff lean.

By Paul Desmond
Senior Editor

ATLANTA — SunTrust Banks, Inc. is relying on automated net management features in IBM's NetView to help its lean staff maintain control of the company's multivendor network.

By relying on NetView's automated command features, SunTrust has been able to suppress 85% of the messages produced by VTAM, enabling NetView operators to view only critical network alarms and alerts. Such features have also helped the company improve its network management without increasing network operations staff.

"In this past year, I'd say we have avoided adding about five people in my help desk area because of NetView," said Thomas Vaughn, senior vice-president and director of communications at SunTrust.

SunTrust uses NetView to manage IBM 3090 and 3084 mainframes at its data centers here and in Orlando, Fla., Vaughn said. NetView also manages some 15,000 CRT or teller terminals, about 3,000 personal computers, 700 automated teller machines and SunTrust's Network Equipment Technologies, Inc. Integrated Digital Network Exchange T-1 multiplexers.

The ATMs are tied to a Tandem Computers, Inc. processor, while some of the terminals are supported by a Digital Equipment Corp. host. Both the processor and the host can pass alarms to NetView via separate NetView/PC applications, Vaughn said.

In many cases, using Command Lists (CLists) included in IBM's Automated Network Automation SolutionPac, NetView can recover terminals that drop out of service when a problem on a line severs communications.

"When [NetView] detects that a terminal has dropped out, it does the things a normal operator would do," Vaughn said. That includes putting the terminal back into service to CICS and testing to make sure the link works.

NetView has also helped SunTrust get a handle on the endless stream of routine messages produced by VTAM. "The normal routine traffic that VTAM lets you know about in a network is just astounding — millions of lines of code a day," Vaughn said.

About 85% of those messages are not related to network problems so SunTrust suppresses and

(continued on page 16)

New APPC helps MVS user develop CICS applications

By Paul Desmond
Senior Editor

ST. PAUL, Minn. — West Publishing Co. is taking advantage of the recently announced APPC software for its MVS mainframes that enables users to develop and test network applications without bringing up IBM's CICS.

IBM's Advanced Program-to-Program Communications /MVS, announced in September, gives MVS direct support for cooperative processing and distributed computing capabilities. Previously, APPC was supported only via teleprocessing monitor subsystems such as CICS.

CICS enables transactions entered at remote terminals to be processed concurrently by user-written applications. However, CICS is notorious for draining CPU power, and the prospect of having to run CICS for multiple test systems wasn't appealing to West Publishing.

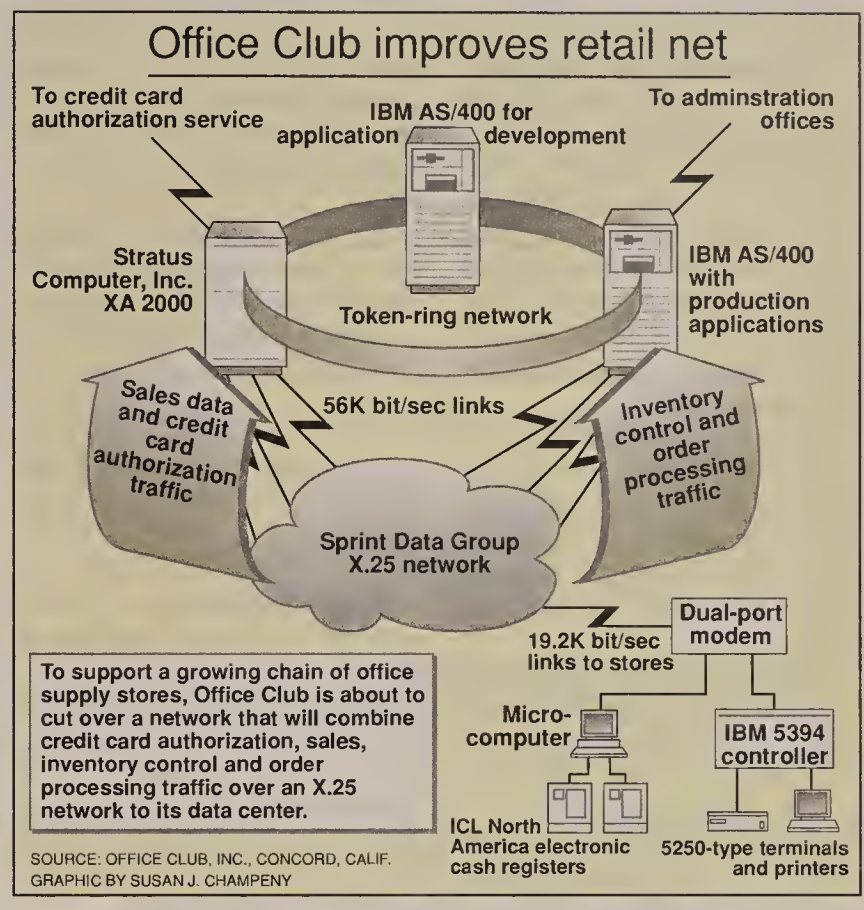
"CICS is pretty big. You can't have 20 CICS test systems out there for 20 programmers," said Al Boll, senior project manager for West Publishing. The company provides printed and electronic products to the legal profession and publishes college textbooks.

The applications developed with the help of APPC/MVS are related to its WestLaw service, which contains case law dating back to the 1700s. WestLaw runs on IBM mainframes here and is accessed by personal computers or custom terminals at customer sites.

APPC is employed to provide some personal computer functions — such as a friendly user interface as opposed to a rigid IBM 3270 command line interface — that act as a front end to help users manage their WestLaw session.

"We're actually using APPC to control communications from application function to application function, whether those programs are on PCs or whether

(continued on page 16)



Office supplier to build transaction net

Office Club's new transaction-based retail net will link 50-plus stores to IBM AS/400, Stratus minis.

By Jim Brown
Senior Editor

CONCORD, Calif. — Faced with booming growth, the Office Club, Inc. is set to cut over next week a network that will link more than 50 stores and an administration building to an IBM Application System/400 in its data center here.

The network will also link electronic cash registers in each store to a Stratus Computer, Inc. XA 2000 minicomputer here that will collect sales figures during the day and switch requests for credit card authorizations to a third-party service bureau.

Office Club will link the Stratus system, the AS/400 supporting remote stores and an AS/400 supporting application development to a token-ring local-area network that will enable the three systems to exchange files.

The office supply retailer will also link a token ring to standalone microcomputers used by executives in an administration building a mile away. They are considering bridging that token-ring to the one being installed in the data center here.

The upgrade was necessitated by the firm's growth, which overtaxed the company's Wang Laboratories, Inc. VS 10000, VS 7310 and VS 5000 systems.

Wang's financial struggle was a factor in Office Club's move to IBM and Stratus. And the application development capabilities offered by the AS/400 plus the transaction processing power of the Stratus more closely matched Office Club's long-range data processing and network strategies, according to Richard White, vice-president of MIS for the firm.

For example, the addition of the Stratus enabled Office Club to upgrade its point-of-sale network, which is used to authorize purchases made with its proprietary credit card. It also allows the company to pull sales data up to the central site. The AS/400 was chosen to provide the processing horsepower needed to support the firm when its sales jump from $285 million this year to a projected $450 million to $500 million next year.

"The combination of the Stratus and AS/400 was better able to meet our processing demands as we grow," White said.

Office Club is also moving off Wang's Wangpac X.25 network to Sprint Data Group's X.25 value-added network.

(continued on page 16)

> The addition of the Stratus enabled Office Club to upgrade its point-of-sale network.
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Data Packets

continued from page 15

Hayes Microcomputer Products, Inc. last week announced it will enhance its Ultra 96 modem to support speeds up to 14.4K bit/sec over dial-up lines by adding support for the CCITT V.32bis standard.

V.32bis was recently adopted by the Consultative Committee on International Telephony and Telegraphy's Study Group XVII as a draft standard and is expected to be adopted as a final standard by February 1991.

V.32bis is an enhancement of the V.32 standard that defines a top speed of 9.6K bit/sec on dial-up lines. In addition to 14.4K bit/sec, V.32bis supports fallback rates of 12K, 9.6K, 7.2K and 4.8K bit/sec.

All registered users of Ultra 96 modems that currently support the V.32 standard will be upgraded free of charge next year to a version supporting V.32bis.

Hayes also said last week it is lowering the cost of its line of microcomputer-resident JT Fax boards, which enable microcomputers to exchange facsimile documents with CCITT Group III fax machines.

The JT Fax 9600B board, which supports 9.6K bit/sec facsimile transmission, dropped in price from $695 to $499. JT Fax 9600B also includes a Hayes Smartmodem 2400B modem and Hayes Smartcom EZ communications software that together support 2,400 bit/sec asynchronous communications between computers over dial-up lines.

The JT Fax 4800B board, which enables IBM Personal Computers to support 4.8K bit/sec Group III facsimile transmission, was cut from $295 to $199, while the JT Fax 4800P, which supports the same function for IBM Personal System/2s, went from $595 to $199. The JT Fax Portable enables portable fax machines to transmit documents at 4.8K bit/sec, and its price was cut from $495 to $199.

GE Information Services (GEIS) last week said it will make ocean shipping tariff rates available to users of its Cargo* Link Services. GEIS is teaming with **Data Exchange International (DXI)** of Pittsburgh to enable Cargo*Link Services users to access DXI's RateMaster tariff data base.

RateMaster provides information on the cost of shipping cargo internationally via ocean liners. GEIS' worldwide Cargo*Link Services is a group of computer and network services for the cargo shipping industry that supports electronic data interchange, electronic mail and data base services.

The addition of RateMaster will enable Cargo*Link Services users to access tariff data on-line or store a copy of the data on a Unix-based system at the customer site.

The on-site system can be automatically updated via GEIS' network each time tariff data changes.

Cone Software of Boothwyn, Pa., last week announced software that will enable programmers to build a graphical user interface for microcomputers emulating an IBM 3270 or 5250 terminal and used to access IBM's mainframe-based Professional Office System (PROFS) electronic mail software.

The software, PROFS Executive, is bundled with HyperHost, a microcomputer-based application development tool written by Cone and Brightbill-Roberts & Company, Ltd. of Syracuse, N.Y. PROFS Executive is a template that enables programmers to offload PROFS screen generation tasks from the host to the microcomputer.

This will enable microcomputer users to perform PROFS functions such as creating, retrieving or answering messages by selecting commands from a menu on the microcomputer screen or by using a mouse to click on an icon.

PROFS Executive translates the microcomputer commands to the syntax the host requires in order to accomplish the desired task and passes those commands to the 3270 or 5250 terminal-emulation session running on the microcomputer, which forwards them to the host.

PROFS Executive runs on IBM Personal Computers and IBM Personal System/2s that are equipped with at least 640K bytes of random-access memory and either a 3270 or 5250 terminal-emulation package.

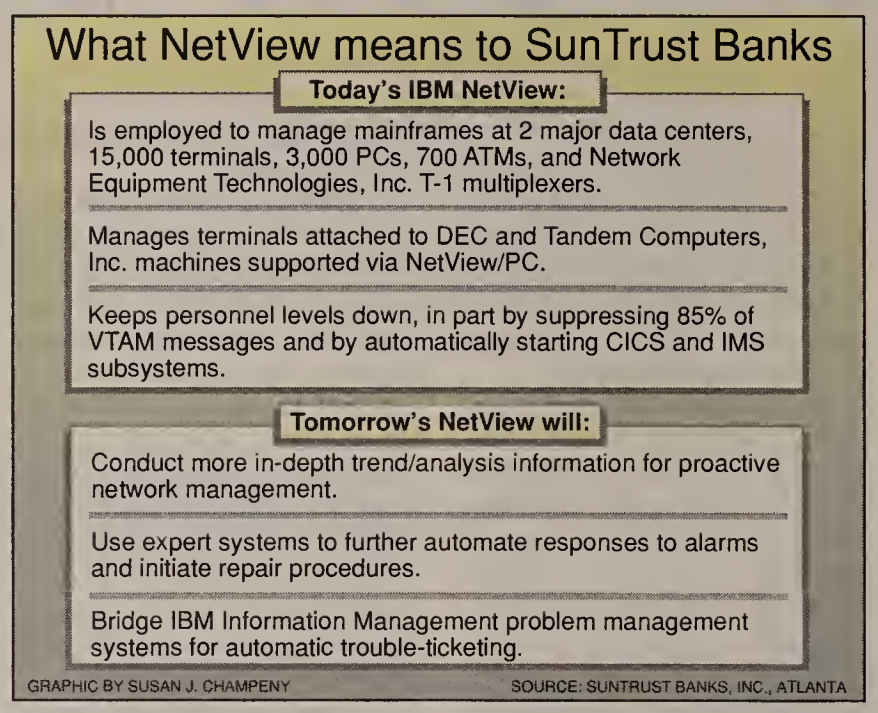
Available now, the software is priced at $17,500 for the first 100 copies and $10,000 for each additional 100 copies.

Bank programs NetView

continued from page 15

logs them in case it needs to refer to them later. Such filtering allows SunTrust to quickly separate high-priority alarms from lower level VTAM messages.

SunTrust has also programmed NetView to automatically restart host subsystems, inority alerts — such as when an ATM is down — by highlighting an alert message on a NetView operator's screen, which is then frozen until the operator responds to the alert.



Some of the code used to perform that function was also provided in the SolutionPac, while some was written by SunTrust, Vaughn said.

SunTrust programmed NetView to respond to some high-priority alerts — such as when an ATM is down — by highlighting an alert message on a NetView operator's screen, which is then frozen until the operator responds to the alert.

SunTrust has also programmed NetView to automatically restart host subsystems, including CICS and IMS, after the company brings them down to refresh host files. That procedure includes bringing up all applications and connecting them to the subsystem. "The total combined time to do all that [each week] was about seven hours," Vaughn said. "It's anywhere from 15 to 30 minutes now."

SunTrust is currently turning its attention to proactive net management by conducting more in-depth analysis of network problems, such as response time degradation, and trying to identify trends that indicate a failure is looming.

That means writing more CLists that look at performance thresholds. For example, if a terminal drops out twice in one week, it could trigger a message to the console operator that a potential problem is brewing.

Among the enhancements Vaughn is looking forward to in NetView Version 2, the first releases of which are due out later this year, is the bridge between NetView and IBM's Information Management problem management system. That will let NetView automatically open a trouble ticket in Information Management, thus obviating the need for net control personnel to manually enter that information.

SunTrust is also evaluating how it will use the LU 6.2 link to NetView supported in Version 2. Vaughn said it could help SunTrust better control its Application System/400 and 9370 midrange computers.

Office supplier to build net

continued from page 15

The AS/400 will be linked to three separate Sprint Data Group network nodes via 56K bit/sec leased lines supporting as many as 32 virtual circuits each. The Stratus XA 2000 will also be linked to three separate nodes via 56K bit/sec links. This will enable the company to better withstand circuit failures by providing enough capacity to both systems.

"We'll always keep excess capacity," White said. "If a single line goes down, we will be able to support our existing network on the remaining lines."

Each store is being outfitted with an IBM 5394 terminal controller supporting three IBM 5250-type terminals and one or two IBM 5250-type printers.

The stores are also being equipped with an upgraded POS system that includes an Intel Corp. 80386-based microcomputer acting as a controller for ICL North America electronic cash registers.

Both the IBM controller and the POS controller will be linked to a dual-port modem at 9.6K bit/sec. The modem supports a multiplexing feature that enables it to feed data from both controllers to the Sprint Data Group network at an aggregate speed of 19.2K bit/sec. The Sprint Data Group network will route data to the appropriate host using X.25 virtual circuits.

These terminals enable store employees to update a centralized customer list each time an individual pays a $10 yearly fee to join the Office Club or a $50 fee to become an Office Club Plus member. Only club members can buy supplies from the outlet.

Office Club Plus members are additionally entitled to a proprietary credit card and the privilege of calling in orders to a central customer service center using an 800 number.

Customer service representatives using terminals enter the order on the AS/400, which then downloads it over the net to a printer in the store nearest the customer, where employees fill the order and ship it out.

> The net marks the first time that cash registers will be on-line with a host at the data center.
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The in-store IBM controller replaces Office Club's existing Wang VS 5000s running X.25 software that link Wang asynchronous terminals and printers to Wangpac at 9.6K bit/sec.

The new network also marks the first time that electronic cash registers will be on-line with a host at the data center. Previously, Office Club waited until each store closed and then uploaded sales data over a dial-up link.

In addition, configuring the Stratus to receive on-line credit card authorization requests and route them to the service bureau via a dedicated facility saves time. Before, dial-up links were established from the store to the service bureau each time an approval was needed.

Pulling sales data up to the Stratus at various intervals each day will enable Office Club to more quickly summarize daily sales figures and pass that data over the token-ring connection to the AS/400.

Executives as well as accounting clerks can access that information using either 5250 terminals or microcomputers emulating 5250 terminals attached to an IBM 5394 controller in the administration building.

The controllers are linked via 56K bit/sec channels on a T-1 circuit to the AS/400 in the data center here.

However, forcing the AS/400 to supply data to executives on an as-needed basis will chew up processing time on the minicomputer. To cut down on some of the expected traffic, Office Club is devising a strategy to download copies of sales and other data to servers on a token-ring LAN in the administration building. This will enable executives to access historical copies of data from the server and only tap the AS/400 when more up-to-the-minute data is needed.

"We haven't finalized how we will connect the LAN in the administration building to the AS/400," White said.

New APPC helps MVS user

continued from page 15

they're on the mainframe," said Dale Peterson, manager of computer systems and programming at West Publishing.

Peterson said his company was trying on its own to give MVS the ability to communicate directly from one application to another when discussions with IBM engineers revealed that Big Blue was developing the same capability. The two companies worked together on the project for more than 18 months, and he said the partnership offered several advantages.

"We were able to avoid having to develop the functionality of APPC ourselves, so it saves us application development time," Peterson said. "And we were able to offer some suggestions and contribute to the functionality in APPC."

Worth Noting

"Surveys we've done with customers indicate that a sizable percentage of their mission-critical applications are running on LANs, and the indication seems to be that [this trend] is growing at a significant rate."

Gene Jurrens
Program manager
IBM U.S. Client/Server Computing
Somers, N.Y.

Netnotes

Cayman Systems, Inc. recently announced a software enhancement to its GatorBox Ethernet gateway that ensures that individual LAN users get equal access to the device. The GatorBox converts Apple Computer, Inc. AppleTalk to EtherTalk or Transmission Control Protocol/Internet Protocol.

Version 1.6 of GatorSystem, the software that runs on the GatorBox, has been enhanced with a new scheduling algorithm that gives all users attempting to send data through the device an equal amount of bandwidth and CPU cycles.

In the past, certain users could temporarily monopolize bandwidth and CPU cycles, forcing others to wait. This enhancement will improve throughput to users by up to 90%, according to the company.

GatorBox, with the new GatorSystem 1.6 software, is available now for $2,795. The software upgrade is available free for current users.

For more information, contact Cayman Systems at 26 Lansdowne St., Cambridge, Mass. 02139, or call (617) 494-1999.

Hughes LAN Systems recently announced a Simple Network Management Protocol (SNMP) agent for its LocalNet 8000 Ethernet and token-bus bridges.

(continued on page 18)

Codenoll, GM unveil plastic fiber Ethernet products

Culmination of joint technology development.

By Tom Smith
Senior Writer

LAS VEGAS — Codenoll Technology Corp. and the Packard Electric Division of General Motors Corp. announced at Comdex/Fall last week several plastic fiber-optic Ethernet products.

The products, which incorporate technology that was developed by the two companies over the past six years, include Ethernet interface boards for a variety of personal computer bus types, a plastic fiber interface for LAN wiring hubs and a plastic fiber transceiver.

Codenoll will sell the products, and GM may incorporate the technology into automobiles for high-speed communications between, for example, engine control computers and dashboard displays.

The two companies announced development of the technology but not specific products at the NetWorld '90 show in Dallas ("Codenoll, GM ready cheap plastic fiber," *NW,* Sept. 24).

Codenoll said it will offer plastic optical fiber Ethernet interfaces for personal computers based on the Industry Standard Architecture, the Extended Industry Standard Architecture and the Micro Channel Architecture. The products are the CodeNet 8631, CodeNet 8621 and CodeNet 8601, respectively, all of which will be available in the first quarter of 1991. CodeNet 8631 costs $495, CodeNet 8621 is priced at $795, and CodeNet 8601 costs $1,295.

The company previously offered glass optical fiber Ethernet interfaces for all of these types of personal computer buses, and it is now able to support plastic fiber with a new plastic fiber transceiver daughterboard for those products.

Current Codenoll users will be able to purchase the daughterboard, dubbed the CodeNet 8681, in next year's first quarter for $395.

The announcement also included a plastic fiber interface card for wiring hubs from Codenoll and 3Com Corp. That new interface, called the CodeNet 8611, is a single-port, single-slot card

(continued on page 18)

Fox's Rushmore to boost response time of DBMSs

LAS VEGAS — Fox Software, Inc. announced at Comdex/Fall here last week that it has developed technology that will dramatically improve the response time of its data base management systems.

Fox said the technology, dubbed Rushmore, will be incorporated into its products in the first quarter of next year.

The first two products to which Rushmore will be added are FoxPro 2.0, the company's DBMS for DOS-based personal computers and local-area networks, and FoxPro/Mac, designed specifically to run on Apple Computer, Inc. stand-alone Macintoshes and LANs.

Fox President David Fulton described Rushmore as a data base access method that allows users to access data at speeds up to two orders of magnitude faster than they could with the existing FoxPro product.

The company claimed that, in one extreme example, FoxPro 2.0 could perform a search more than 3,000 times faster than Ashton-Tate Corp.'s dBase IV product. "But we're not suggesting those are typical improvements," Fulton said.

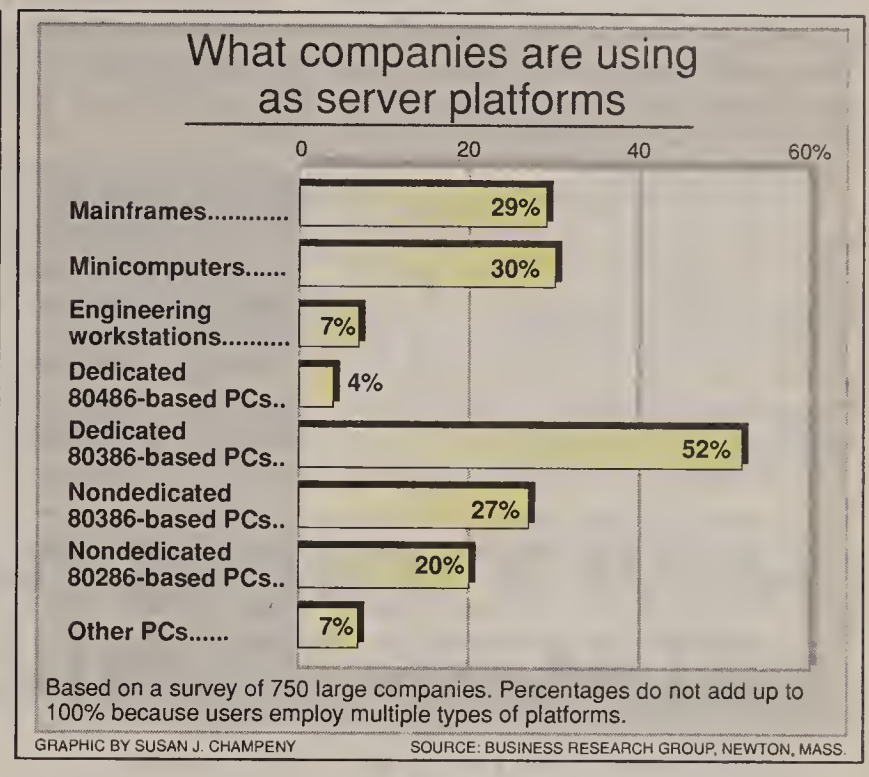
A key factor in speeding the search process was a reduced data base index size. FoxPro 2.0 and FoxPro/Mac indexes are one-sixth the size of those in the existing FoxPro product. "The smaller they are, the faster you can access them," Fulton said.

Among a host of other enhancements made to the DOS-based FoxPro and incorporated into FoxPro/Mac is SQL support.

As part of its SQL support, Fox developed a function it calls Relational Query-by-Example, whereby a user with no programming skills can specify the data needed and the software will generate an SQL query.

FoxPro 2.0 is scheduled for availability in the first quarter of 1991, and FoxPro/Mac is expected to be available 60 to 90 days later. Pricing has not been determined for either product.

For more information, contact Fox at 134 W. S. Boundary, Perrysburg, Ohio 43551, or call (419) 874-0162.



Based on a survey of 750 large companies. Percentages do not add up to 100% because users employ multiple types of platforms.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: BUSINESS RESEARCH GROUP, NEWTON, MASS.

Study: Client/server computing on a roll

Two-thirds of the largest U.S. firms use the technology or will implement it in near future.

By Tom Smith
Senior Writer

NEWTON, Mass. — A recent survey indicates that two-thirds of 750 of the largest companies in the U.S. have already implemented or plan to implement LAN-based client/server architectures to support mission-critical applications.

The report, "Market Opportunities in Client/Server Computing," from Business Research Group (BRG), a research firm in Newton, Mass., is based on responses from 750 Fortune 1,000 users in six industries: manufacturing, retail, health care, insurance, banking and telecommunications.

Of those 750 users, 500 respondents, or two-thirds, said they are implementing or plan to implement client/server computing. Specifically, 42% of the 750 are implementing client/server computing today, while 24% plan to implement the technology in 12 to 18 months. By contrast, 33% of the total respondents had no client/server plans.

Of the 500 current and future users of client/server products, 64% have already implemented the technology, while 36% said they plan to do so within 18 months.

"Client/server applications are seen as a way of making a company more competitive, bringing data closer to the users and making it easier for users to use that data," said Thomas Wood, an industry analyst at BRG. "And that was true across all industries."

Users feel increasingly comfortable about putting mission-critical applications on local-area networks, Wood said. In the manufacturing industry, for example, respondents cited a computer-aided design/computer-aided engineering application that is well-suited to a client/server architecture.

In such an application, a common data base would enable product design to take place online while simultaneously allowing other employees to compute the cost of designing the product. At the same time, a user on the manufacturing floor could examine the design to determine how to manufacture the product. "Such an application would obviously be mission-critical because it makes everyone more efficient and reduces lag time," Wood said.

"Client/server applications are seen as a way of making a company competitive."

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Paralleling the growth of client/server applications has been the acceptance of high-end, dedicated personal computers as LAN servers, Wood said (see graphic, this page).

In most cases, Wood said, personal computer servers are not

(continued on page 18)

Netnotes

continued from page 17

The SNMP agent is available as a free software upgrade to current LocalNet 8000 users. They will be able to install the software and manage the LocalNet 8000 bridges using any SNMP management workstation, including Hughes LAN Systems' NetDirector 9100.

LocalNet 8000, which is no longer in production, was recently replaced by the higher performance ProBridge product line.

The upgrade enables Hughes LAN Systems users to keep pace with the latest in management capabilities, according to the company.

For more information, contact Hughes LAN Systems at 1225 Charleston Road, Mountain View, Calif. 94043, or call (415) 966-7300.

Banyan Systems, Inc. recently announced that its VINES local-area network operating system now supports IBM's new Personal System/2 servers and workstations.

In addition to supporting the new PS/2 Models 90 and 95, Banyan said support for IBM's recently introduced OS/2 Version 1.3 will be included in the next release of VINES, which is currently being beta-tested.

For more information about the operating system, contact Banyan at 120 Flanders Road, Westborough, Mass. 01581, or call (508) 898-1000.

Codenoll, GM unveil plastic fiber products

continued from page 17

for 3Com's MultiConnect hub and Codenoll's MultiStar OEM version of the 3Com hub.

Both of the hubs are 15-slot enclosures that support Ethernet over shielded and unshielded twisted pair, thick and thin Ethernet cabling and glass fiber.

Maximum run of 50 meters

The new CodeNet 8611 supports plastic fiber cable runs to individual workstations outfitted with plastic fiber-optic interfaces. As released, the new Codenoll workstation and hub interfaces will support a maximum cable run of 50 meters between the workstation and the wiring closet.

According to Brian Ramsey, director of marketing at Codenoll, the company's goal is to extend that distance to 100 meters.

CodeNet 8611 will be available in the first quarter for $495.

Codenoll announced the products and explained the technology behind them at an Institute of Electrical and Electronics Engineers, Inc. meeting last week. Ramsey said the company hopes to promote the technology as a standard.

GM declined to disclose when or how it will implement the technology, but Bob Steele, staff development engineer for the Packard Electric Division of GM, said it will be considered for any communications at 150Kbit/sec or above in an automobile.

Study: Client/server computing on a roll

continued from page 17

replacing machines such as minicomputers and mainframes. They are, however, functioning not only as servers but also as gateways into minicomputers and mainframes.

"PC servers can complement the minicomputers or mainframes by putting information closer to the people that need to access it," agreed John Dunkle, vice-president of WorkGroup Technologies, Inc., a consulting firm in Hampton, N.H.

But Marty Palka, senior industry analyst for networking at Dataquest, Inc. in San Jose, Calif., said he believes "people will start to move applications off the minis and onto the servers because of price/performance. You'll definitely see servers impacting the mini marketplace."

Regardless of the server platform, users are interested in client/server computing primarily to solve business problems, Wood stressed.

"What they need is user-friendliness on the mainframe," Wood said. "They don't necessarily need client/server. They need a solution, and client/server provides that solution right now."

One result of the trend toward client/server computing will be a decrease in Novell, Inc. NetWare's LAN operating system market share, which BRG estimates at 57%. Within the next 12 to 18 months, NetWare will only be purchased by 44% of the users surveyed.

Multitasking operating systems will chip away at that lead, BRG said. Banyan Systems, Inc.'s VINES, a Unix-based operating system, will increase its market share from 5% to 8%, while IBM's OS/2-based LAN Server will increase from 10% to 15% and Microsoft Corp.'s OS/2 LAN Manager will go from 5% to 6%.

Finally, users said their main concern with implementation of client/server computing is vendor support, primarily due to the complexity of the technology.

Dataquest's Palka attributed that finding to the higher cost of high-end servers, which will bring MIS staff into buying decisions. "MIS is going to end users and saying, 'How good are these guys, how will they be able to support you?' " he said. "The price is going up, so expectations are too."

WorkGroup Technologies' Dunkle disagreed that users' main concern is support, however. "Their concern is if they off-load the information down to the server, whether they can secure it in the ways they are used to in the mainframe or mid-range environment," he said.

Worth Noting

"Too many IS managers think technological knowledge is the sole criterion for doing a good job. They don't realize they also need managerial skills to deliver programs on time, on budget and to the customer's requirements."

John Censor
President
Planning & Control, Inc.
A New York-based consultancy that provides project management training to MIS managers at Fortune 500 companies.

Association Watch

The **National Engineering Consortium** will hold a series of educational meetings at The Peabody Hotel in Orlando, Fla., from Dec. 10 to 14. Speakers at the forums will discuss the latest in communications, computer technology and business/marketing issues.

The topics will include "Fiber: Window to the World" on Dec. 10 and 11, "Broadband: Converging on the Future" on Dec. 11 and 12, and "Information Networking: Passport to a New Era" on Dec. 13 and 14.

There is a $985 fee to attend each forum.

The National Engineering Consortium is a nonprofit organization aimed at advancing the field of engineering and computer science through educational programs.

For more information on the meetings, call (312) 938-3500.

The national **Society of Telecommunications Consultants (STC)** concluded its 1990 Fall Conference and Annual Membership meeting by announcing results of the elections for its board of directors and officers.

Elected to the 13-member STC board are: Dale Mullen,
(continued on page 21)

Dealing with multivendor network service problems

Users find ways to stop vendor finger pointing.

By Maureen Molloy
Staff Writer

A multivendor network can be a powerful application platform, but managing such a network involves one major headache — coordinating service among multiple carriers and equipment vendors.

Users, tired of vendor finger pointing, have adopted a number of strategies for ensuring prompt solutions to network problems. The alternatives range from complete self-maintenance — if in-house expertise is sufficient — to total reliance on a single vendor.

Coordinating service among multiple vendors is a major concern of most network managers because multivendor networks are a fact of life.

According to The Ledgeway Group, a research organization based in Lexington, Mass., 50% of companies recently surveyed operate networks incorporating equipment from five or more vendors. More than 90% of the respondents said they operate networks using products from two or more vendors.

Managers of mission-critical networks say the best strategy is to make every vendor responsible for any network downtime.

"I refuse to accept the 'Hey, it's not my problem' excuse. I insist that all my vendors stay involved in any network problem until it's resolved," said Chuck Garrison, vice-president of telecommunications at the Chicago Board Options Exchange, Inc. "Smooth service is crucial in this business because for every minute the network is down, millions [of dollars] are being lost on the trading floor."

Glenn Miller, manager of worldwide videoconferencing at
(continued on page 21)

> Managers say the best strategy is to make every vendor responsible.
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GUIDELINES

BY BRUCE ELBERT

Rapid reaction protects against the unexpected

Network departments must be able to deal with an unexpected service disruption, even if the cause is external to the company. Contending with outside problems requires that a network manager develop a rapid-reaction posture.

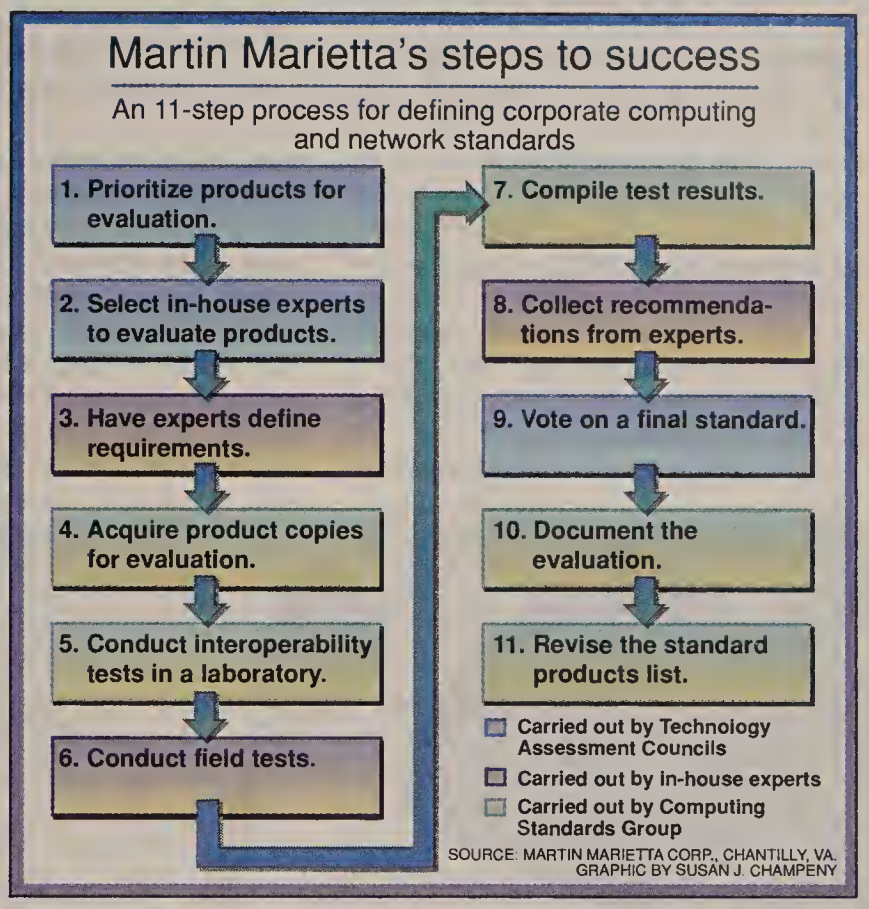
Contrary to popular belief, private networks are really not that private because they employ network services provided by other carriers. Interfaces with the local and long-haul public networks can introduce problems that propagate throughout a private network.

Many private net service problems stem from maintenance mistakes made by technicians working for common carriers. A typical example is the inappropriate transfer of a channel service unit (CSU) into the loop-back mode, which is typically done to perform link error-rate performance tests.

Technicians can remotely put a CSU into this mode by sending the appropriate digital command over the same T-1 line that carries the organization's traffic. Propagation of this control signal through a private backbone, while unintentional, can interrupt service at every point where a T-1 terminates on a privately owned device.

Another serious threat is posed by bugs in the software that controls carrier switching systems as well as the intelligent devices in your private net. For example, the major failure of
(continued on page 21)

Elbert is director of operations for a large communications company and author of several books on telecommunications and information technology.



Firm finds new way to enforce standards

Martin Marietta sets corporatewide standards by putting end users in charge of the process.

By Wayne Eckerson
Senior Editor

CHANTILLY, Va. — When it comes to enforcing corporatewide standards for the purchase of network equipment, Martin Marietta Corp. learned that if you can't beat end users, you might as well join them.

Instead of imposing standards by fiat from corporate headquarters, Martin Marietta has turned over to end users the responsibility for evaluating, testing and selecting computer and network products to be included on the firm's standard product list.

The user-driven standards-setting process, which is based on an 11-step methodology and covers microcomputer and local-area network equipment, has boosted the standards compliance rate to 80% and gained the respect and cooperation of users at Martin Marietta's five independent business groups, according to Chris Gladwin, manager of emerging technologies here.

The program, which was initially established in 1986, has enabled the aerospace firm to achieve a greater degree of interoperability among products, obtain greater discounts on volume purchases and provide better service to end users, according to Gladwin.

"We now drive users to buy standard products by creating consensus and making sure there are concrete advantages for doing so," Gladwin said.

Users oversee the standards-setting process through two Technology Assessment Councils (TAC), each of which comprises 50 users representing all Martin Marietta locations and divisions. One TAC addresses microcomputer products and the other LAN gear.

The TACs, which meet formally four times a year and more often through impromptu videoconferences, decide which category of products should be evaluated for inclusion on the list of standard products. They then identify a group of "experts" among Martin Marietta's 60,000 employees who are most familiar with that product category.

Martin Marietta's Computing Standards Lab

The experts define their product requirements, which include performance, pricing and compatibility with existing stan-
(continued on page 21)

SAIC help desk uses VMXworks to assist users around the world

Integrated voice messaging/voice processing platform lets company expand service hours without hiring more workers.

By Salvatore Salamone
Features Writer

SAN DIEGO — Science Applications International Corp. (SAIC) solves the network and computing problems of several thousand employees worldwide through a single help desk, using VMX, Inc.'s VMXworks integrated voice-messaging and voice processing platform.

SAIC has operated a help desk for three years, but it was only open during West Coast business hours. The company realized it needed coverage during other hours, especially since it was conducting business in more countries.

So the company implemented VMX's voice response/voice mail system to support the Information Center Help Desk, located in SAIC's headquarters here. The voice response/voice mail system allows employees to get help with problems whenever they need it, not just during headquarters' business hours.

Help desk technicians still work regular hours but in emergencies, callers can contact someone in SAIC's computer center, which is manned 24 hours a day. For non-emergencies, callers interact with help desk personnel through temporary voice mailboxes.

SAIC has found that by using this new help desk system, it can provide the company's network users with vastly expanded hours of coverage without hiring extra staff.

"One of the biggest problems with the old way we were doing things was that we had no after-hours coverage," said Ronald Scott, telecommunications manager at SAIC. "People seldom need help at convenient times."

Problems like the ones SAIC faced are typical in help desk operations. Simply hiring more people will not solve the uneven work load problem; it's not practical to have the staff cover every hour of every day for the worst case scenario.

How it works

Combining voice messaging with an interactive voice response system solves SAIC's help desk coverage problem. Each new caller is assigned a number for a temporary voice mailbox. This temporary mailbox is used for all messages between the caller and the help desk personnel. Once the problem is resolved, the temporary mailbox is closed.

Users calling into the system are asked to identify, from a voice response menu, what type of problem they are having. They can select from among the following areas: networking problems, data communications problems, personal computer software or hardware problems, or they may inquire about the schedule of technical training classes offered by the MIS department.

> The voice response/voice mail system allows employees to get help with problems whenever they need it.
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Once callers specify the type of problem by pressing the appropriate telephone key, the VMXworks system asks them to enter their telephone number, again by striking the telephone keys.

Callers are then prompted to leave a name and a short message describing the problem. The system then assigns them a number of a temporary voice mailbox.

One feature, not currently used by SAIC, enables the system to automatically page a technician if the caller's message isn't retrieved within an hour.

Most problems can be handled by technicians on the help desk. If a problem requires more expertise, the technician can consult with one of SAIC's network managers or with someone in SAIC's personal computer lab, according to Scott.

With the new system, users can call in problems throughout the night. When help desk personnel arrive at work in the morning, they can prioritize the problems, which helps them plan their time.

It also enables the company to make better use of its help desk resources. For example, Scott can assign the more difficult problems to senior staffers. The help desk technicians also do not have to spend as much time on the phone as they would with the old system.

Once a message has been heard, help desk personnel and specialists can leave a return message or speak directly with the person who placed the call. A technician may leave a message with instructions to solve the problem.

In addition, by virtue of the two-way messaging feature of the help desk system, help desk personnel no longer have to play "telephone tag" with callers. "The specialists are able to get more accomplished this way," Scott said.

Firm finds new way to enforce standards

continued from page 19

dard products, among other things. They then field-test a prescreened list of vendor products and submit recommendations to the appropriate TAC.

The TACs then select a vendor product for inclusion on the standard product list based on the experts' recommendations.

To assist in this process, Martin Marietta established the Computing Standards Group (CSG), based here, which is composed of 13 corporate information systems and network professionals. Their job is to recommend what products the TACs should consider evaluating and conduct preliminary testing on vendor products in their 2,600-sq.-ft. laboratory.

Every product under evaluation gets tested with the firm's standard products and applications, which now number about 200, to ensure compatibility with the existing standard product line, Gladwin said.

The CSG also is responsible for marketing standard products to the company's employees through newsletters, catalogs and abundant use of electronic mail, Gladwin said.

"Marketing the products is almost as critical as getting users to buy in to the products," said Gladwin, who assesses new technologies for the CSG.

> Every product gets tested with the firm's standard products and applications, which now number about 200.
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Big savings, better service

The CSG works with Martin Marietta's training department to organize training sessions for the firm's technicians who will be called on to support the products.

Gladwin said when a piece of recommended equipment breaks, users know they can call a Martin Marietta service technician who can fix it almost immediately or get a spare unit from the firm's warehouse, which is not the case with nonstandard products.

By providing high-quality service, Martin Marietta is better able to motivate end users to purchase products on the list.

The CSG also notifies the corporate purchasing department of specific vendors whose products make the list so that bulk contracts can be negotiated with those vendors.

While Martin Marietta's business groups make their own purchasing decisions, they can draw off the corporate contracts and receive significant price discounts, Gladwin said.

Gladwin said the existence of legitimate corporate standards has enabled Martin Marietta to save between $4 million and $10 million a year through volume discounts.

Besides the financial benefits, the standards have given Martin Marietta more leverage in getting vendors to modify their products to meet the company's interoperability needs. Many vendors now consult with the Computing Standards Group prior to developing a product so they can ensure that the offering will conform to Martin Marietta's specifications.

"Because of the standards, we've been able to get vendors to create a 'Martin Marietta' version for some of their products," Gladwin said.

Dealing with net service problems

continued from page 19

the Upjohn Co. in Kalamazoo, Mich., concurred with Garrison, adding that dependable service is vital.

"If you don't have the in-house expertise to isolate network problems, you better make sure you've hired vendors you can count on," Miller said.

Loyalty and dependability should be a pivotal consideration when choosing a vendor, he said. Those qualities are best determined by talking with some of the vendor's current and former customers.

Miller said he insists that each of his vendors participates in his company's network planning so they understand and appreciate corporate objectives.

For some users, the best solution is to rely on a single vendor for service and support.

Harvey Shrednick, vice-president of information services at Corning, Inc. in Corning, N.Y., says his primary troubleshooter is the vendor whose equipment supports the network's most mission-critical operations. That vendor, he added, must essentially act as an extension of the user's staff.

For example, when looking to integrate the company's digital private branch exchange and voice mail systems, Shrednick held his switch vendor responsible for resolving any problems that arose after the systems were interconnected.

"First, I determine who my most important vendor is, and then I make that vendor aware of the added responsibility," Shrednick said. "To make this work, you have to feel confident that this vendor will do his best for you."

Henry Pfendt, director of information technology services at Eastman Kodak Co. in Rochester, N.Y., said his company outsourced its telecommunications network to Digital Equipment Corp. mainly because it didn't want to deal with all the problems that can arise when managing a multivendor network.

"Digital has the expertise and could do a better job of ensuring that the network runs smoothly," he said. "All I care about is that the network lives up to expectations, and Digital does what it must to see that I'm happy with the results."

Donald Augustin, director of the planning and technology division at McDonnell Douglas Aerospace Information Services Co., said users should exploit competitive pressures to get better service from their vendors.

> "If you don't have the in-house expertise, you better make sure you've hired vendors you can count on."
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"There's little difference in the types of services different vendors supply, but there are differences in the quality of service," Augustin said.

"The increased competitiveness among vendors should be used as significant leverage to getting optimal service," he said.

Protecting against the unexpected

continued from page 19

AT&T's network on Jan. 15 was caused by a problem in the network control software that assigns backup capacity. Ironically, it was intended to provide redundancy.

Another external source of network problems is malicious outsiders. The Internet, perhaps the most extensive private data network in the U.S., disrupted computing services at numerous universities and government research centers when an individual set off a worm program that raced throughout the network.

In short, external problems can and will enter a network and affect it in unpredictable ways. The best way to prepare is a rapid-reaction posture. This involves the following.

- **Know where the network is vulnerable to external forces.** In other words, identify the interface points with those of other networks, such as local exchange carriers and long-haul service providers. Keep tabs on the carriers' local access connecting devices and routing.
- **Maintain a data base of the routing of local and long-haul circuits.** By graphically analyzing information from this data base, network staff members will be able to determine the cause of problems and possible solutions.
- **React quickly to problems.** Delay can allow them to multiply rapidly, as in the case of the Internet worm.
- **Provide the technical staff with useful technology.** This technology includes nationwide pagers, cellular telephones, E-mail, computer simulation models and on-line data bases. These tools can improve communications and effectiveness when an organization is under pressure to resolve a problem.
- **When dealing with the network staff during an emergency, don't accuse them.** Give them a chance to try solutions. People should feel comfortable taking the risk of trying to solve the problem.

Because all contingencies cannot be anticipated, a rapid-reaction posture can only establish an awareness of the need for quick response and foster a state of readiness. The key is to empower staff members to act quickly and decisively.

Association Watch

continued from page 19

president; Ben Sanford, executive vice-president; Barbara Grothe, senior vice-president and treasurer; Jim Farstad, vice-president and secretary; and Laura Sikorski, vice-president. Directors include Doug Cleveland, Jane Laino, Sherry Magness, Nate Mire, Bruce Nelson, Lou Nicholson, Jim Posner and Marty Prunty.

Elected to the six-member Vendor Advisory Council are: Barbara Wingle, president; Glyn Simmons, vice-president; Fran Blackburn, vice-president and secretary; Sharyl Hennard, director of education; Lou Kratzer, director of membership; and Diane Reeber, director of regionalization.

The STC will hold its 1991 Spring Conference in May in Chicago and its 1991 Fall Conference and Annual Membership Meeting the weekend prior to the '91 Tele-Communications Association, Inc. conference to be held in September in San Diego.

For more information on the STC, call Mary Murphy at (800) 782-7670.

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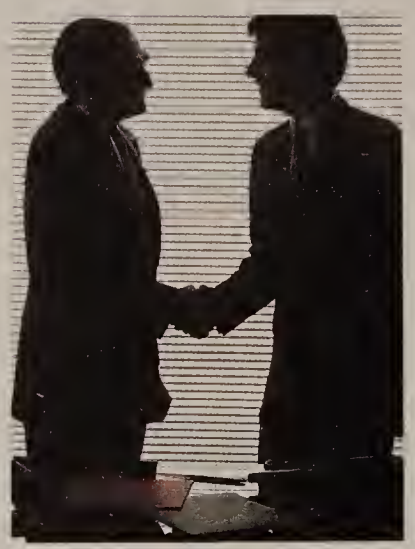
There's more to being a systems integrator than just saying so. International Data Corporation – the renowned industry research firm – has established criteria to benchmark those who claim to be systems integrators. They must:



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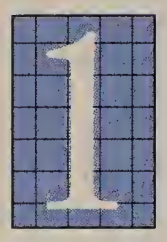
SEVEN WAYS TO MAKE OR BREAK YOUR EUROPEAN HUB.



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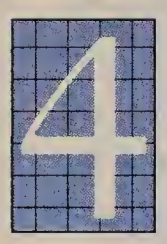
Make it redundant.

Back-up hubs keep information moving when the primary hub is "down". But beyond increasing reliability, secondary hubs also give you more flexibility as your operations — and markets — grow.



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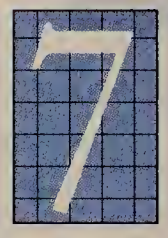
Profit from the intense competition in today's communications market. Find a quality/cost ratio that won't compromise performance *or* your budget.



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Worth Noting

Electronic Data Systems Corp. (EDS) in Plano, Texas, recently landed a 10-year, $300 million contract to take over data processing and worldwide network operations for Sweden's Saab-Scania, AB. About 250 Saab DP employees will transfer to EDS payrolls.

World News

Argentina recently privatized its state-owned carrier, **Empressa Nacional de Telephonos (ENTEL),** for $5 billion of debt relief and $214 million in cash. The part of ENTEL that serves the northern half of the country was sold to a consortium including Spain's Telefonica de Espana and Citicorp, while the part that serves the southern half was bought by a group including the Italian telecommunications company Societa Finanziaria Telefonica P.A.

Last week, **AT&T, British Telecommunications PLC, France Telecom and Kokusai Denshin Denwa, Ltd.** said they will enhance their one-stop shopping service for international private nets by jointly designing user networks, housing user equipment and fixing outages.

MCI donates E-mail boxes, usage fees to ITU members

Carrier's charity to help streamline group's work.

By Maureen Molloy
Staff Writer

GENEVA — To help the International Telecommunications Union (ITU) in its efforts to promote free and open communications throughout the world, MCI Communications Corp. will donate electronic mail services to 3,000 ITU members.

Pekka Tarjanne, secretary-general of the ITU, said MCI's contribution of E-mail resources, which includes as many as 3,000 MCI Mail mailboxes and a maximum of $1 million in usage, would help advance ITU's work.

> "The goal is to migrate people within ITU to newer means of conducting business."
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ITU is a United Nations agency responsible for planning and regulating worldwide telecommunications systems. It includes such standards-setting bodies as the Consultative Committee on International Telephony and Telegraphy and the International Radio Consultative Committee.

"The increased use of information technology can certainly improve ITU's operations and enhance its effectiveness for the benefit of the entire telecommunications community," Tarjanne said. "It will accelerate the standards-making process in a cost-effective manner and enable participation from countries that, until now, were unable to have timely access to information."

MCI will interconnect its MCI Mail service with ITU's Telecom Information Exchange Services (TIES) net via an X.400 gateway. That will allow TIES and MCI Mail users to exchange messages.

New ways of doing business

Stephen Geis, chief of ITU's Network and Communications Systems Division, said the goal of the project is to migrate people within ITU to newer means of conducting internal business.

"Our organization is inundated with paper since many drafts are created in the course of developing standards," Geis said. "E-mail will speed up the process of exchanging these documents with other members, increasing the productivity of ITU."

As part of its contribution to ITU, MCI will underwrite up to $1 million of usage for transmitting E-mail, including messages to other MCI Mail, TIES and Internet users, as well as for MCI Mail Fax Dispatch delivery within the U.S.

MCI is also offering ITU use of its Impacs service, an international packet-switching service that will allow designated North American users to access ITU data bases and TIES interactive services, including E-mail, bulletin board, document exchange and computer conferencing.

> "E-mail will speed up the process of exchanging documents with ITU members."
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BT Tymnet's San Jose, Calif., net control center

British Tel merger bolsters Tymnet net

IVAN gains worldwide presence, net expertise, as well as cash for upgrading, expanding net.

By Barton Crockett
Senior Editor

SAN JOSE, Calif. — Despite some difficulties along the way, BT Tymnet, Inc. is apparently benefiting from its merger with British Telecommunications PLC.

Users, analysts and BT Tymnet officials say the acquisition of Tymnet by British Telecom has improved BT Tymnet service by enabling the international value-added network (IVAN) company to upgrade facilities and increase the number of countries it serves. The company has also benefited from British Telecom's worldwide presence and networking expertise.

But these benefits have come at the cost of layoffs and changes in product direction that disturbed users and led to some customer defections.

"I'd say there were some difficulties, but it's been [a] positive [step] overall," said an MIS director for a large international user of BT Tymnet IVAN services who requested anonymity.

British Telecom completed the acquisition of Tymnet from McDonnell Douglas Corp. one year ago tommorrow at a cost of $355 million.

New focus

Perhaps the most important thing BT Tymnet gained from the change in ownership was a shift in management focus. Analysts and users said the company was hamstrung under McDonnell Douglas because the defense contractor was reluctant to commit the resources needed to operate a topflight IVAN and equipment maker.

Under British Telecom, however, analysts say BT Tymnet is

(continued on page 26)

Merger bolsters Tymnet net

continued from page 25

getting more support.

"As a part of the core business, it's bound to get not only more investment, but more talent, press attention — everything," explained Eric Arnum, editor of the industry newsletter, "Electronic Mail and Microsystems," in New Canaan, Conn.

Mark Baker, BT Tymnet's president and chief executive officer, agreed. "The core businesses of the companies are very closely aligned, and that's of great benefit to both organizations."

Global presence

Users of BT Tymnet services have been particularly pleased with the expanding international presence of the company.

According to a BT Tymnet spokesman, the company owned and operated nodes in about 10 countries prior to the acquisition. Since then, that number has doubled, according to Michael Rude, BT Tymnet's director of application services.

Rude said BT Tymnet probably would not have been able to establish so many new nodes had it remained a unit of McDonnell Douglas because of reluctance on the part of the parent company to make such an investment.

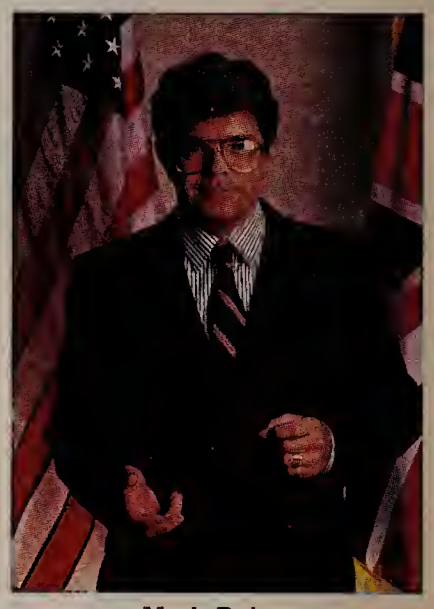
In addition, the merger of BT Tymnet's and British Telecom's public packet facilities has enabled BT Tymnet to increase the number of foreign public data nets it accesses directly.

"[BT] Tymnet's expanding into many hard-to-reach areas, particularly in the Middle East and Asia, where we do a lot of business," said Robert Jones, a manager of automation technology at Bechtel Power Corp. in Gaithersburg, Md., which has been a customer of the company for six years.

The merger has also enabled BT Tymnet to increase its presence in the U.K.

Rude added that by merging British Telecom and BT Tymnet network traffic, the companies have been able to cost-justify the use of more high-quality digital private lines.

Analysts said BT Tymnet is also benefiting from access to British Telecom's research and development facilities and by



Mark Baker

working with the carrier to jointly develop such offerings as the Concert Integrated Management System integrated network management package.

Some difficulties

But the merger has also had its rough spots. A few months after the deal was completed, BT Tymnet layed off more than 200 of the 1,800 employees in the newly combined BT Tymnet and British Telecom IVAN operations in order to eliminate redundant positions, a company spokeswoman said.

In addition, BT Tymnet has begun phasing out its OnTyme public E-mail service in favor of British Telecom's Dialcom service.

Dialcom relies on vastly different user and application interfaces than OnTyme, according to Rude. Some OnTyme users, including International Data Group, the publisher of *Network World,* decided to switch to other vendors rather than make the transition from OnTyme to Dialcom.

Extensive layoffs

Meanwhile, extensive employee layoffs have hurt user confidence in some product offerings, according to Arnum.

"[Dialcom] customers called me and said 'I can't believe those guys are doing that,' " he said. "I think some of the other carriers cherry-picked some of [Dialcom's] bigger customers."

First Look

AT&T cuts facsimile service prices

AT&T recently announced new features and price reductions for its **AT&T Enhanced Facsimile** and **AT&T Mail-FAX** services.

Enhanced Facsimile, a store-and-forward fax service, now offers an economy delivery option that gives customers a 10% discount when they schedule nonurgent transmissions for delivery during off-peak hours. In addition, a new custom logo option allows customers to include their corporate logos on faxes for an annual fee of $12.

AT&T also said it cut fax broadcast rates for two to 50 recipients by as much as 50% per page. It also decreased the cost per page by as much as 9% for messages to a single U.S. destination and set a 60% lower price for confirmation of message delivery.

AT&T MailFAX is a store-and-forward feature of AT&T Mail that allows customers to create messages on personal computers or terminals for delivery to Group III fax machines.

AT&T also will offer custom logos and a custom signature option to MailFAX users for $12 each per year. Economy delivery will transmit messages during off-peak hours but within 24 hours of receipt. Other reductions include a more than 20% discount for messages sent to domestic fax machines, a 19% reduction for domestic fax delivery during economy periods and a 10% discount for international delivery.

Contact your local AT&T representative for more information.

GEM unveils line of modem sharing units

GEM Technology, Inc. recently announced a line of four modem-sharing units designed to let multiple terminals or hosts share a single modem and telephone line.

GEM's new **MSU-8423** is an eight-port unit that supports both RS-232 and RS-423 connections. The **MSU-425** and **MSU-825** are four- and eight-port models, respectively, which support only RS-232 links. The **MSU-435** is a four-

(continued on page 33)

MSR rolls out services for its large help desk users

Help Desk Express provides additional advice.

By Wayne Eckerson
Senior Editor

ATLANTA — Micro Support Resource Corp. (MSR) recently announced a comprehensive package of on-line support services for IBM-compatible personal computer users that will supplement the help desk operations of large companies.

Help Desk Express adds a number of new services to Answerline, the company's existing on-line personal computer support service.

Answerline provides basic on-line support services to IBM-compatible personal computer users running any of more than 40 popular MS-DOS-based business software packages. With Answerline, subscribers can call a toll-free number to get assistance regarding the use of microcomputers, peripherals or software programs.

Help Desk Express includes other services to help users utilize their personal computer resources efficiently. They include advice on selecting hardware and software products, software installation support, network and personal computer maintenance, and troubleshooting.

According to Robert West, president and chief executive officer of MSR, the company provides basic personal computer support to more than 15,000 Answerline subscribers through its dial-up support center here. It solves 95% of all problems within five minutes.

"Help Desk Express can supplement help desks at larger companies, and permit expensive and experienced in-house personnel to develop and implement strategic applications," West said.

> Help Desk Express includes other services to help users utilize their PC resources efficiently.
>
> ▲▲▲

MSR's help desk is open from 8 a.m. to 8 p.m. and comprises a staff of six full-time and four part-time help desk operators who collectively answer about 250 to 300 calls a day. Using dumb terminals, these operators access a proprietary knowledge-based help desk system that resides on an MSR minicomputer.

This knowledge-based system

(continued on page 28)

HSC Software announces multimedia pack for LANs

LOS ANGELES — HSC Software recently announced a version of its multimedia software that runs on industry-standard local-area networks.

The software enables users to store and retrieve still images, video, voice and text on a central data base, which they can access to develop multimedia marketing or training presentations.

The SanteFe Media Manager LAN can operate on LANs supporting Novell, Inc.'s NetWare, Microsoft Corp.'s LAN Manager or Banyan Systems, Inc.'s VINES network operating systems.

The software allows users to present still images, graphics or full-motion video in a programmed sequence in tandem with audio presentations. The presentation could be shown to a group via a single workstation or broadcast to multiple users across a LAN.

HSC said the software is suited for business presentations, educational and training environments, and for special vertical market segments such as the travel and entertainment industries, which require integrated audiovisual and text files.

Client/server

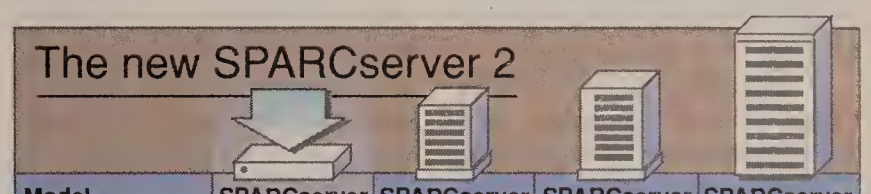
The software consists of server and client workstation components.

The server software interfaces with a Borland International, Inc. Paradox data base management system to access locally stored text or graphics information, or to provide the network address of video data stored on CDROMs, videocassette recorders or laser disks attached to the network.

Workstation software acts as a requester that asks the server software to download specific files.

Multimedia presentations can

(continued on page 29)



Model	SPARCserver 2	SPARCserver 330	SPARCserver 470	SPARCserver 490
Date introduced	Nov. 1990	April 1989	May 1990	Dec. 1989
Packaging	desktop	deskside	deskside	deskside
Expansion slots	3 SBus slots	5 VME slots	12 VME slots	16 VME slots
MIPS	28.5	15.8	22.6	22.6
SPARC processor	40 MHz	25 MHz	33 MHz	33 MHz
Main memory	16M-96M bytes	8M-72M bytes	32M-672M bytes	32M-672M bytes
Users supported	10-30	10-30	25-50	40-80
Disk capacity	7.6G bytes	2G bytes	10G bytes	32G bytes
Base configuration	16M bytes, 876M bytes (SCSI), 2.3G-byte, 8mm tape drive, CDROM and 19-in. monochrome monitor	8M bytes, 669M bytes (SCSI), 150M-byte tape drive and CDROM	32M bytes, 669M bytes (SCSI), 150M-byte tape drive and CDROM, or the same with 911M bytes (IPI)	32M bytes, 911M bytes (IPI) and CDROM
Base price	$24,595	$28,900	$59,900	$99,000

IPI = Intelligent Peripheral Interface (6M byte/sec)
MIPS = Million instructions per second
SCSI = Small Computer System Interface (1.5M-1.8M byte/sec)
SPARC = Scalable processor architecture

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: SUN MICROSYSTEMS, INC., MOUNTAIN VIEW, CALIF.

Newest Sun server outshines old units

Desktop SPARCserver 2 operates at 28.5 MIPS, making it an attractive alternative to rival offerings.

By Maureen Molloy
Staff Writer

SAN JOSE, Calif. — Sun Microsystems, Inc. recently announced the SPARCserver 2 and SPARCstation 2, which are Reduced Instruction Set Computer-based products that deliver nearly twice the performance of earlier products.

The new systems deliver a 50% improvement in data throughput and an almost two-fold improvement in CPU performance over the original models. And they still fit into the small "pizza box" CPU package introduced with the first SPARCstation in 1989.

The SPARCserver 2 is a file and data base server for small and midsize work groups that consist of 10 to 30 workstations.

The system is designed to provide high performance at a low cost.

The $24,595 device can process 51.9 data base transactions per second when supporting Sun's Database Excelerator and the Sybase, Inc. data base.

It can also act as a file and application server for personal computers running PC-NFS.

The server supports up to 96M bytes of main memory and up to 7.6G bytes of Small Computer System Interface (SCSI) mass storage. Disk I/O throughput can be increased by adding two 5M byte/sec SCSI bus controllers.

The system can be configured with a 150M-byte, ¼ in. tape drive, a 2.3G-byte, 8mm tape drive or a SunCD CDROM storage device.

The server also features three SBus expansion slots for adding such features as a second Ethernet card, an eight-port serial card or special-purpose I/O cards. It also comes with a 19-in. monochrome monitor, allowing users to run window-based server administration software such as SPARCserver Manager or SunNet Manager.

The SPARCserver 2 will compete against other entry-level net servers such as Digital Equipment Corp.'s DECsystem 5000/200, Hewlett-Packard Co.'s 9000 645S/845S and IBM's RS6000 POWERserver 320.

The single-processor SPARCserver 2 can process 28.5 million instructions per second or 4.2 million floating point operations per second.

The server comes with an Ethernet adapter and has built-in support for networking protocols such as Network File System,

(continued on page 28)

MSR rolls out help desk services

continued from page 27

consists of a data base of more than 40,000 possible user questions and corresponding answers.

It contains a profile of every subscriber that includes the subscriber's name, address, and hardware and software configuration, among other things.

The system's data base is derived from more than 100,000 actual problems and is continually updated with the introduction of new software and hardware products whenever new problems come to light, West said.

Help Desk Express consists of the following on-line services that users can purchase separately for a fixed annual price.

■ **Hardware maintenance dispatching.** If MSR operators determine that a caller's problem is hardware-related, they will call the company's maintenance provider and track the problem until it's resolved.

■ **Software installation support.** MSR operators guide users through the installation procedures for loading software on their personal computers and help them troubleshoot installation problems.

■ **Software feature comparisons.** Operators at MSR compare the features of different software packages, including ease of use and compatibility with other packages.

■ **Advanced software feature usage.** MSR operators provide help using advanced features of MS-DOS software applications.

Help Desk Express also consists of the following four consulting services that are provided by MSR analysts on a project basis for a negotiated fee.

■ **Client-specific network support.** MSR will provide basic network support for current clients, including adding and deleting users from the network, man-

Server outshines old units

continued from page 27

Transmission Control Protocol/ Internet Protocol, PC-NFS and TOPS.

The SPARCstation 2 family of workstations includes three new devices: a high-end workstation simply called the SPARCstation 2, and two high-performance graphics workstations called the SPARCstation 2GS and SPARCstation 2GT.

The products are aimed at users in the traditional scientific and technical markets and are packaged in the same compact CPU enclosure as the earlier SPARCstation 1.

Each of the SPARCstation 2s come with 16M bytes of main memory, expandable to 96M bytes, and a 1.44M-byte DOS-compatible floppy disk drive. They can accommodate a maximum of 414M bytes of internal hard disk storage and, using external disk storage devices, up to 7.6G bytes of SCSI mass storage.

The workstations run Sun's SunOS operating system, which is compatible with Unix System V Release 4. They also support Sun's Open Look graphical user interface.

The SPARCstation 2, which now represents Sun's highest end SPARCstation, costs $14,995.

Graphics workstation

The new SPARCstation 2GS is a three-dimensional graphics workstation capable of performing full-featured 3-D solids modeling — enabling users to manipulate models at or close to real time — and 24-bit true color rendering.

The base configuration includes all of the graphics hardware.

For users with more sophisticated graphics requirements, Sun also announced the SPARCstation 2GT, which delivers five times the speed of the GS model and higher quality rendering capabilities.

Field upgrades to the new systems are available for SPARCstation 1 users. Shipment of the upgrades are expected to begin in the first quarter of 1991.

SPARCstation 2GS costs $26,995. SPARCstation 2GT costs $49,995.

Sun Microsystems can be reached at 2550 Garcia Ave., Mountain View, Calif. 94043; (415) 960-1300.

aging print queues, changing network access rights and dispatching technicians to fix faulty network equipment.

■ **PC technology planning.** MSR analysts provide advice on maximizing a subscriber's existing hardware and upgrading to new operating environments.

■ **Software and hardware compatibility.** MSR will test any combination of personal computer hardware and software products that a subscriber is considering purchasing and will report whether the configuration meets the user's expectations.

■ **Software and hardware selection.** MSR analysts help subscribers decide what personal computer hardware and software to purchase to best meet their current and future requirements.

In addition, companies that subscribe to Help Desk Express also receive detailed usage reports that catalog a variety of items, including the number of calls logged, the percentage of calls resolved on-line, the percentage that required additional research and the number of calls related to specific software packages.

Currently, Help Desk Express supports only MS-DOS-based personal computers and software. However, MSR will enhance Help Desk Express to support Apple Computer, Inc.'s Macintosh computers by January, West said.

MSR is currently introducing Help Desk Express in the U.K. and will soon launch the package in other European countries later this year, West said.

Answerline, the core service of Help Desk Express, ranges in price from $130 to $250 per year per personal computer, depending on the number of users in the plan. The eight other services comprising Help Desk Express range in price from $20 to $50 per personal computer per year for each additional service.

For more information, contact MSR at 3355 Northeast Expwy., Suite 150, Atlanta, Ga. 30341, or call (404) 452-7676.

HSC Software announces pack

continued from page 27

be shipped to a color workstation that can act as a video monitor or display a video presentation in an on-screen window while text or graphics are displayed in other windows.

Two-mode workstations

HSC also said network managers can set up workstations in either of two modes. Some workstations can act as full-function devices, capable of editing voice/data files, adding voice clips to a video file and constructing a basic presentation. Other nodes can be granted read-only access to files.

The Paradox DBMS is used to store text and graphics files, and it can also be set up to archive the location of video and audio data. When a user requests a certain video program, for instance, the data base looks up its network address and hands the information off to the SanteFe Media Manager LAN software, which issues a system call to a VCR or laser disk to play back the requested program.

SanteFe Media Manager LAN supports a variety of scanners, video cameras, laser disk players and VCRs, which can be used as data input devices or storage subsystems.

HSC President John Wilczak said high-end VCRs, such as NEC Corp.'s PC VCR, can time-stamp certain programs and provide data base systems with a list of those time stamps, which act as storage addresses for video data.

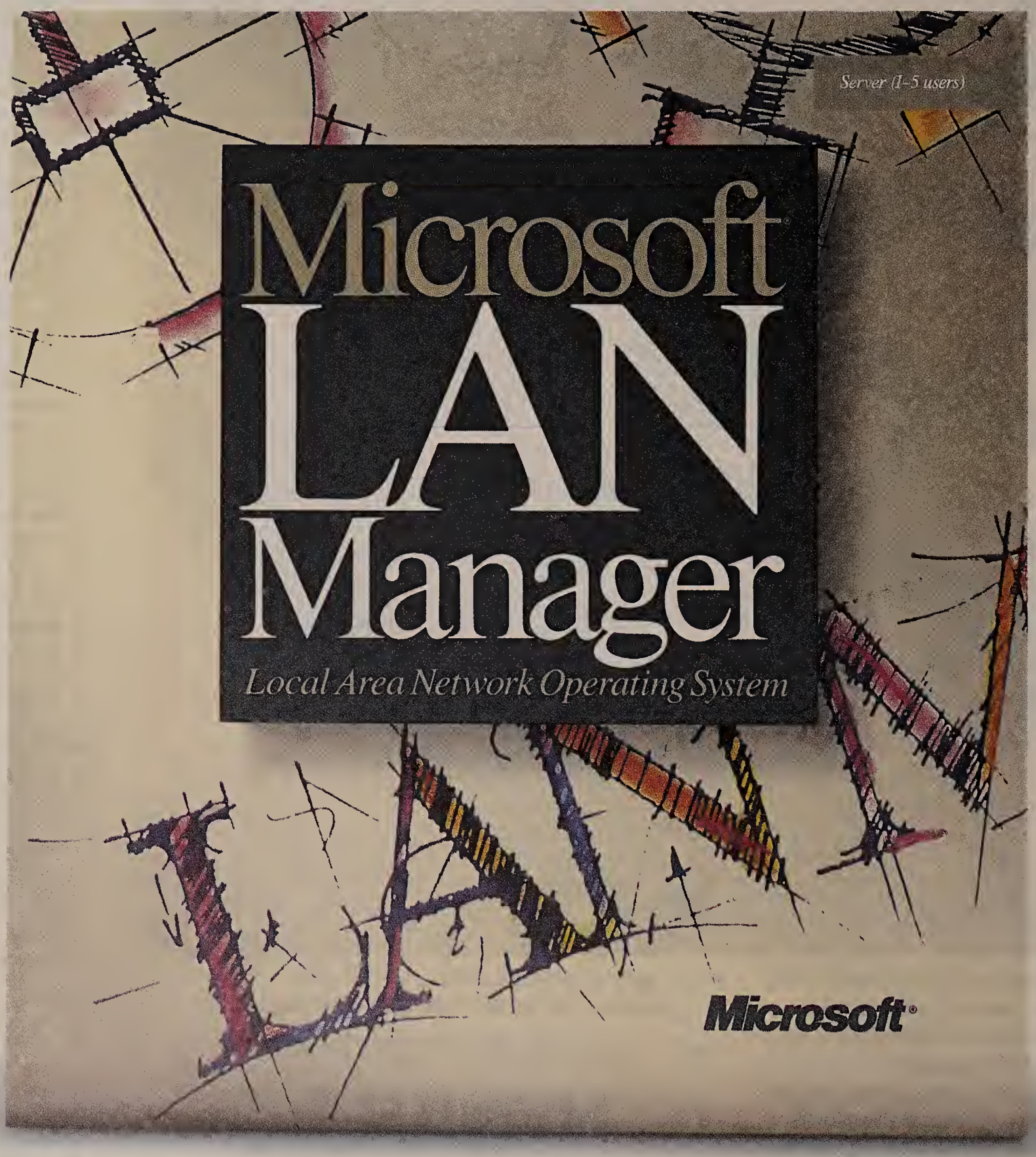
The server components of SanteFe Media Manager LAN runs on an Intel Corp. 80286-based personal computer running DOS 3.3 or higher and uses 400K bytes of memory. Workstation software consumes 315K bytes of local memory when establishing a server connection. The software also requires users to add a video graphics adapter (VGA) color monitor and VGA adapter card.

Users wishing to integrate audio data with text or video files must add a separate audio card.

The SanteFe Media Manager LAN costs $895 for server software and $150 for each LAN node. The software is available now.

For more information, write to HSC Software at 1661 Lincoln Blvd., Suite 100, Santa Monica, Calif. 90404, or call (213) 392-8441.

Think of it as an investment with immediate dividends.



And long-term gains.

The ideal network software should help you run all your departments.

Including those departments you haven't connected yet.

Introducing LAN Manager 2.0 from Microsoft. Its long list of standard features includes fault tolerance, 32-bit support and enough security to keep all your confidential data confidential.

Plus, it's flexibly priced, based on the number of users. Which makes it a good value as well as a good product.

Innovative programs like Lotus Notes,® Saros™ FileShare,™ and Microsoft SQL Server take advantage of the Microsoft platform.

But down the line, choosing LAN Manager 2.0 will demonstrate even more than good value.

It will demonstrate vision. That's because its revolutionary client-server architecture gives you the capabilities you'd expect from larger systems.

Making it viable, for the first time, to run critical applications as well as non-critical ones on your own standard PC network.

And since client-server architecture can marry high-level control with all the speed and accessibility of a PC network, its future is indeed shining bright.

An observation not overlooked by the many systems companies who are selling and supporting it to the fullest.

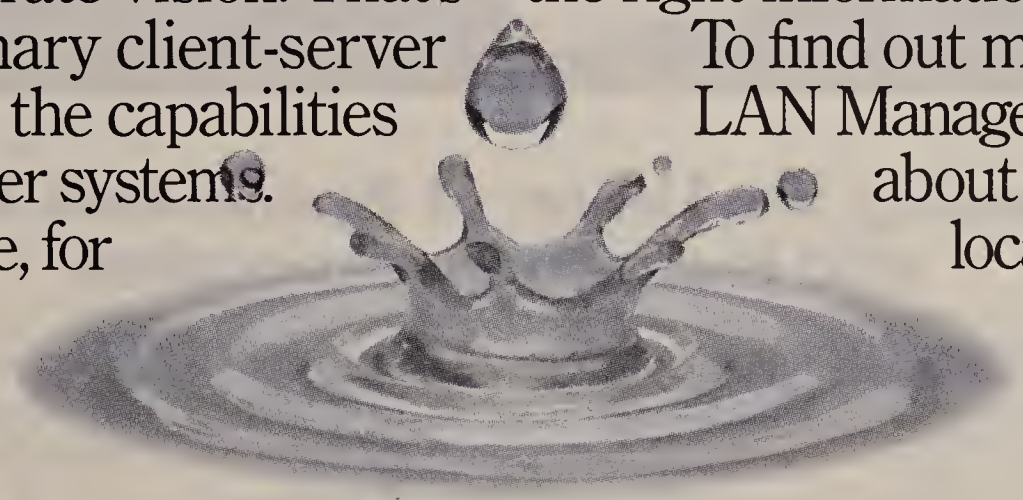
Among them: 3Com, AT&T, DEC, HP, IBM, NCR and Ungermann-Bass.

But there's more to the story. Now your network administration will be more manageable, too, thanks to LAN Manager's multi-server administration tools. Plus, it's got the power to handle multiple processors.

Because the Microsoft environment is wide open, so is the future.

So no matter how big your network grows, it won't outgrow LAN Manager.

LAN Manager. Part of Microsoft's line of network products designed to let everyone make the right connections to the right information.



From one central point, you can have an impact across the whole network with features like domains.

To find out more about Microsoft® LAN Manager 2.0, or to get details about a fact-filled seminar located near you, call us at (800) 227-6444, Department P04. And we'll introduce you to a program that will more than fulfill the promise of every blue-chip investment: The longer you have it, the better it looks.

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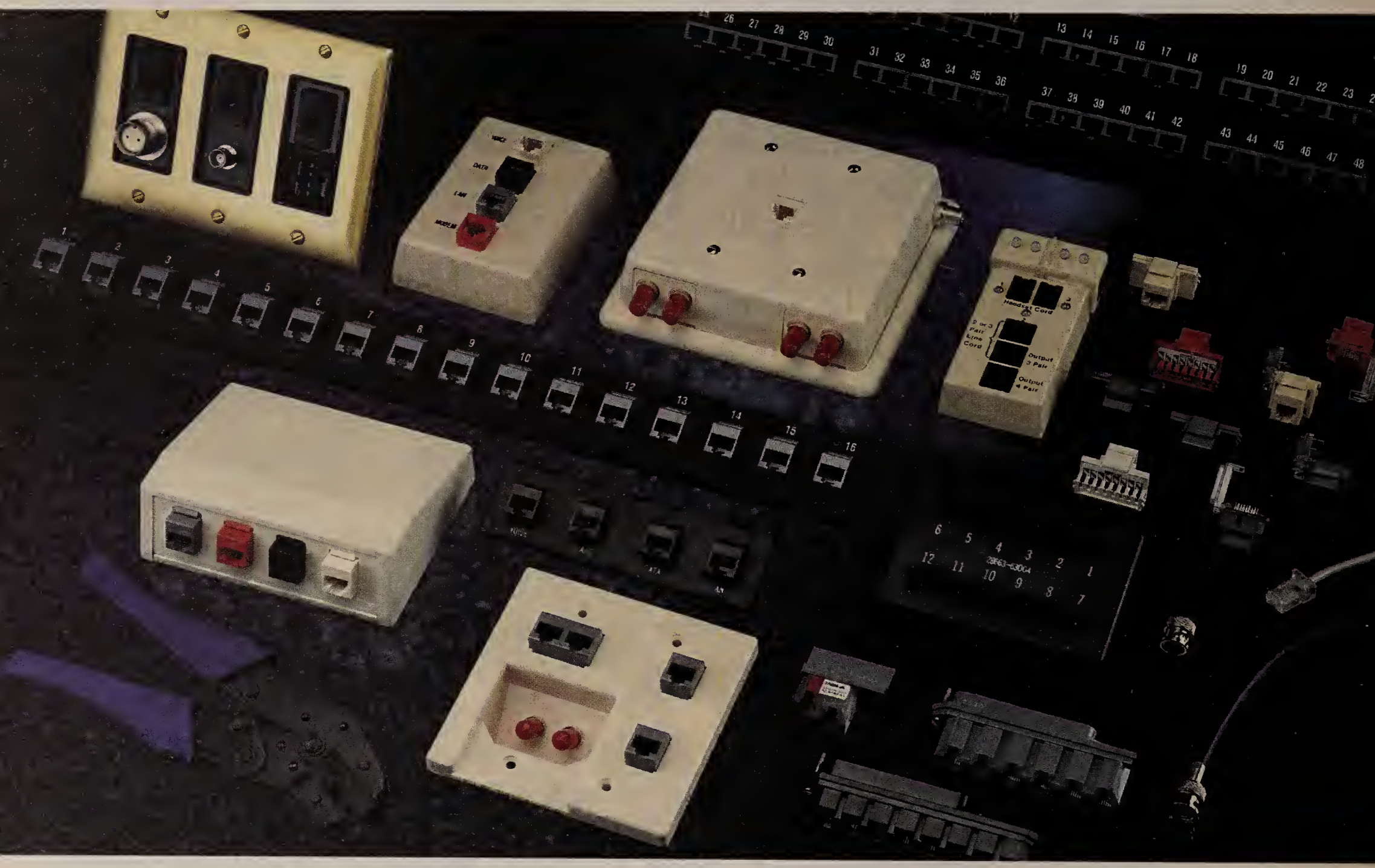

Announcing the Union of Brand-Rex Telecom and Hubbell Incorporated

Quality, innovation, ease of use and simple installation are critical in the world of premise wiring voice and data products. Recognizing this, two leaders in their respective fields have teamed up to offer voice and data wiring products at unparalleled levels of quality.

Hubbell Premise Wiring, Inc. is a new subsidiary of Hubbell Incorporated, formed by the combination of two established, well-respected names: Brand-Rex Telecom and Hubbell Incorporated. Brand-Rex people are acknowledged experts in the design, manufacture and application of station termination, cross connection, and voice/data adapter products, as well as plugs, jumpers, tools and testers. Hubbell Incorporated is the company that, for more than a century, has set the standard of excellence for specifiers, engineers and contractors and a company that has established itself as the leader in providing high quality, contemporary premise wiring systems.

We've set out to make this subsidiary the new standard. So when you want the greatest value in voice and data premise wiring solutions, choose products made by Hubbell Premise Wiring, Inc.

For more information on products, local representatives or authorized distributors, call (203) 423-7783.

See The FAXNeT Form on Page 33

Hubbell Premise Wiring, Inc.
A subsidiary of Hubbell Incorporated
1548 West Main Street
Willimantic, CT 06226-1128

First Looks

continued from page 27

port unit that supports V.35 connections.

The units can be set up to support terminal port scanning for applications when usage is evenly split among terminals or to support port prioritization when some terminals need priority over others. The modem-sharing units support transmission speeds of 50 bit/sec to 2.048M bit/sec (V.35). All models support data streaming detection, which takes a terminal port out of service if data streaming occurs.

The units range in price from $425 for the MSU-425 to $995 for the MSU-435.

GEM Technology, Inc., 17 E. Hibiscus Blvd., Suite 103, Melbourne, Fla. 32902; (407) 725-5581.

Avalan remote LAN software supports Microsoft Windows 3.0

Avalan Technology, recently announced support for Microsoft Corp.'s Microsoft Windows 3.0 software in its **Remotely Possible** remote access software for Novell, Inc. NetWare local-area networks.

Version 2.0 of Remotely Possible enables NetWare users to open up an on-screen window to remotely control and monitor personal computers on the LAN. The software also lets users switch to local DOS mode while running a remote session and provides enhanced security and remote printer features.

Avalan Technology said the software operates with NetWare over Ethernet, token-ring and Arcnet networks. The software operates as a terminate and stay resident program, taking up 17K bytes of memory space.

Version 2.0 is scheduled to ship at the end of this month. It will cost $199 for a license that serves two users and as much as $1,299 for one that serves 512 users.

Avalan Technology, 747 Washington St., Holliston, Mass. 01746; (508) 429-6482.

RAD unveils an SNMP-compliant network management product

RAD Network Devices, Inc. recently unveiled a Simple Network Management Protocol (SNMP)-compliant network management product.

OpenRemote Internetwork Management (OpenRIM) is software that runs on a Unix workstation. It enables users to manage hardware from RAD Network Devices and other vendors with SNMP agents that report to the SNMP management station on activity within specific devices.

RAD Network Devices simultaneously announced SNMP agent software for its bridge/routers.

OpenRIM provides users with SNMP management capabilities such as the ability to receive real-time statistics and alarms, query SNMP agents and monitor their responses. It also lets users assign tasks or set parameters for those devices. The software supports the X Window System and the Open Software Foundation's Motif graphical user interface.

OpenRIM software, priced at $2,650, is expected to begin shipping in December. The SNMP agent software will be offered as a software upgrade.

RAD Network Devices, 7711 Center Ave., Suite 600, Huntington Beach, Calif. 92647; (714) 891-1954.

Random offers an internal 9.6K modem for laptop computers

Random Corp. recently announced an internal 9.6K bit/sec modem for its **Colleague Laptop Terminal.** The modem adheres to the CCITT V.32 standard and, like the 1,200 and 2,400 bit/sec models, comes with Microcom, Inc.'s Microcom Network Protocol 5 error correction and data compression.

The Colleague Laptop Terminal emulates Digital Equipment Corp. VT-100 and VT-220 terminals, and interfaces to most host systems. It provides single-key access to the host through each of its 20 autoconnect channels. In addition to the RJ-11 modem connection, the product has a parallel printer port and an RS-232 serial port with 75 to 19.2K bit/sec settings.

The product uses an enhanced Supertwist LCD 80X25 screen with optional backlight and is powered via an alternating current outlet or can run up to 15 hours on its internal rechargeable battery.

The 9.6K bit/sec option costs $695.

Random Corp., 581 Northland Blvd., Cincinnati, Ohio 45240; (513) 825-0880.

Verilink offers DSU/CSU with fractional T-1 capabilities

Verilink Corp. last month announced the release of its **ConnecT,** a fractional T-1 data service unit/channel service unit (DSU/CSU). ConnecT allows users to select bandwidths in any multiple of 56K or 64K bit/sec, up to the full 1.536M bit/sec of T-1.

It also provides flexible channel assignment, allowing users to place data in contiguous, alternate or randomly selected individual DS0 channels.

For isolating problems, the unit has an array of diagnostic tools including data terminal equipment and repeater loopbacks, as well as the Quasi-Random Signal Source test capability.

The DSU/CSU costs $2,750.

Verilink Corp., 145 Baytech Drive, San Jose, Calif. 95134; (408) 945-1199.

OPINIONS

ON THE ROAD

BY SALVATORE SALAMONE

Bates Motel '90: Chocolates but no phone jack

Like most traveling network users, I'm accustomed to the conveniences of office networks and want them while I'm on the road. I haven't traveled much to underdeveloped countries and would be prepared to put up with much inconvenience if I did. But I do travel around the U.S., where conditions for the data user are, let me tell you, horrendous.

Hotels are supposed to cater to the traveler, and the best ones have always claimed some insight into travelers' needs. What many don't seem to notice is that their old telephone systems just won't work where data is concerned. Perhaps they think that business travelers should be isolated from their corporate networks. Of course, just the reverse is true.

> Anyone who has traveled with a laptop and modem has at least one horror story.
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Everyone wants to read their messages or send data back to the office when traveling. That's what has sparked the booming growth of laptop computer sales. But even seasoned travelers have trouble communicating because the hotels go to extremes in protecting transmission wires. For example, they use long bolts to secure telephone faceplates to the wall, which makes it difficult to get at the phone wires to make a connection. Anyone who has traveled with a laptop and modem has at least one horror story about having to strip the hotel's telephone wires with razor blades or move furniture to get at phone cords that are hard-wired to the wall.

Hotels replace fabrics, linens and other replaceable items every five to seven years. Yet, the capitalization cycle for telecommunications equipment in hotels is between seven and 10 years, according to John Salmen, technology and information director for the American Hotel and Motel Association. He says that 90% of hotels that serve mainly business travelers now have facsimile machines. Then he adds the bad news: Only about 40% of hotel rooms have modular jacks. Since few of us carry acoustic couplers any more, 60% of the time we are going to have problems hooking our modems to the network.

This situation will undoubtedly improve — most likely slowly — unless traveling data users take action. At a session on portable messaging at the Electronic Messaging Association's most recent meeting in San Francisco, panelists suggested the following as ways of alerting the hotel industry to the importance of this issue:

- Call ahead and ask if the hotel has modular phone jacks or a data port on the room telephones. If they don't, tell them you can't stay there.
- Fill out the comment cards in the hotel rooms. If there is an RJ-11 jack, tell them you stayed there because it was available. If not, tell them you won't return because you need one.
- Make it company policy to stay only at hotels that have RJ-11 jacks, and make sure the hotels know that's your policy.
- Tell them you're sick of paying surcharges on 800 numbers and credit card calls.
- Urge hotels with good communications facilities to publicize that fact. Tell them that prior knowledge of in-room modular phone jacks would influence your decision about where to stay.

The hotel industry lives for customer satisfaction; that's what they sell. If enough people complain about the lack of modular phone jacks in rooms and surcharges on toll-free calls, the hotel industry must respond. If they can put a color television in every room, they can install proper phone jacks as well.

Salamone, a modem-packing frequent flyer, is Network World's *features writer.*

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An IDG Communications Publication

EDITORIAL

NW/DCI announce vertical industry conferences

Networking is having a dramatic impact on every industry. It is helping companies in all lines of business maximize investments in information technology while improving productivity and profits. But users in different vertical industries face unique challenges in developing net strategies and applications that meet their business needs.

At *Network World,* our mission is to provide information that network executives need to do their jobs well and to help their companies succeed.

Our goal is to offer the most timely coverage of the issues facing our readers, whether those issues affect all readers or those in a single vertical industry.

To serve our readers better, we're proud to announce that in 1991, *Network World* will cosponsor with Digital Consulting, Inc. a series of conferences focused on the network needs of users in key vertical industries.

The *Network World*/DCI partnership is natural. *Network World* is the voice of network users; DCI is an acknowledged leader in the field of information systems training.

The conferences will provide an opportunity for a detailed examination of the management, industry and technology concerns shaping network strategies in specific vertical industries.

In line with *Network World's* commitment to network professionals, users will play a key role in shaping the conferences and participating in them.

The conferences will be designed for and by users in each vertical industry.

We'll also ask leading vendors of network products and services to be on hand to discuss their vertical industry customer strategies.

Among the conferences planned is the Financial Networks Conference for users in the financial services, banking and insurance industries, scheduled for May 8 to 10 in New York. Another is the Manufacturing Networks Conference, to be held Aug. 12 to 14 in Chicago.

If you're interested in receiving more information about these and other conferences or if you'd like to participate, write to *Network World* Editor John Gallant at the address above or drop us a note via our electronic bulletin board system (see instructions in the Table of Contents on Page 2).

We need your input to ensure that the vertical industry conferences meet your needs. We hope to hear from you.

OPINIONS

INTEROPERABILITY

BY MARY JOHNSTON-TURNER

Standards are moving targets for harried users

Users should beware of vendor claims regarding the standards compliance of their products. They should also carefully ascertain whether their vendors have enhanced the standard, resulting in a high-function but less than interoperable product.

The implementation of X.25 is a good example of why user skepticism regarding claims of standards compliance and transparent interoperability is important in ensuring end-to-end network functionality.

Essentially, X.25, like many standards, went through a number of enhancements over the years. The result was that the CCITT's 1980, 1984 and 1988 recommendations varied significantly. While functionality improved, the chances of equipment from multiple vendors being transparently interoperable were reduced.

X.25 standardized the network interface reasonably well, but vendors continued to add functionality enhancements via the use of proprietary protocols between X.25 nodes. These enhancements made it difficult to mix X.25 switches from multiple vendors in a single network and helped vendors differentiate themselves from one another.

In the 1990s, the need for generic standards-based interoperability vs. the need for vendors to differentiate themselves must continue to be a major user concern. Whether it's Integrated Services Digital Networks, Open Systems Interconnection network management or any other developing standard, users must understand what they are getting for their investment in "standards."

There are numerous examples of standard ISDN terminal adapters or customer premises equipment failing to work transparently when attached to different central offices or private branch exchanges.

Essentially, users of a local exchange ISDN Centrex service must coordinate their customer premises equipment investment with the central office from which they are served. Further, they should not expect to transfer that investment easily to another central office. Features and functions vary as vendors seek to provide value-added extensions to the standard.

Network management is in much the same situation. The OSI/Network Management Forum has published a detailed specification for object definitions and a grand plan for a standards-based network management platform.

> Users must understand what they are getting for their investment.
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Yet vendors are still negotiating bilateral arrangements between platforms and element manager systems to provide functionality not covered by the forum's recommendations.

Users, many of whom have developed standards-based network architectures in hopes of avoiding vendor-specific interoperability problems, find their sophisticated architectures stymied by enhanced standards. Worse, they find their telecommunications staffs consumed by the demands of troubleshooting multivendor integrated systems, which were supposed to have been interoperable.

Some of the largest users, generally those that are also the strongest believers in a specific emerging standard, invest substantial staff and capital resources in building internal test labs. Several ISDN users, including Intel Corp. and the University of West Virginia in Morgantown, have taken this approach.

Most users, however, have had to rely on vendor-sponsored integration and conformance testing, or industrywide conformance certification by such groups as the Corporation for Open Systems and Bell Communications Research.

Regrettably, vendor-sponsored conformance, such as AT&T acting as an early certifier of ISDN implementations, is tainted by self-interest. Nonprofit, objective conformance testing suffers from the usual problems of limited funds and competing pressures from sponsors. In some cases, there is no one group or organization specifically chartered to test all aspects of the standard.

To benefit from commitment to standards, users must be careful to identify the flavor of the standard to which they are committing. They must also carefully document any extensions added by their vendors. Later additions to the network must conform to the correct version and recognize the selected enhancements.

Whether users like it or not, standards are unlikely to be the silver bullet freeing them from reliance on vendor-specific solutions. If companies use networks to gain a competitive edge, at least some portion of that advantage is likely to come from vendor-specific enhancements to the standards.

Users will continue to have to balance their near-term functionality requirements against the slow progress and generic implementations of standards-based solutions. Nine times out of 10, extensions and enhancements are likely to provide the edge in exchange for some level of vendor-proprietary solution.

Balancing the goal for open systems with the demand for value-added solutions will be a major challenge for network managers in the coming years.

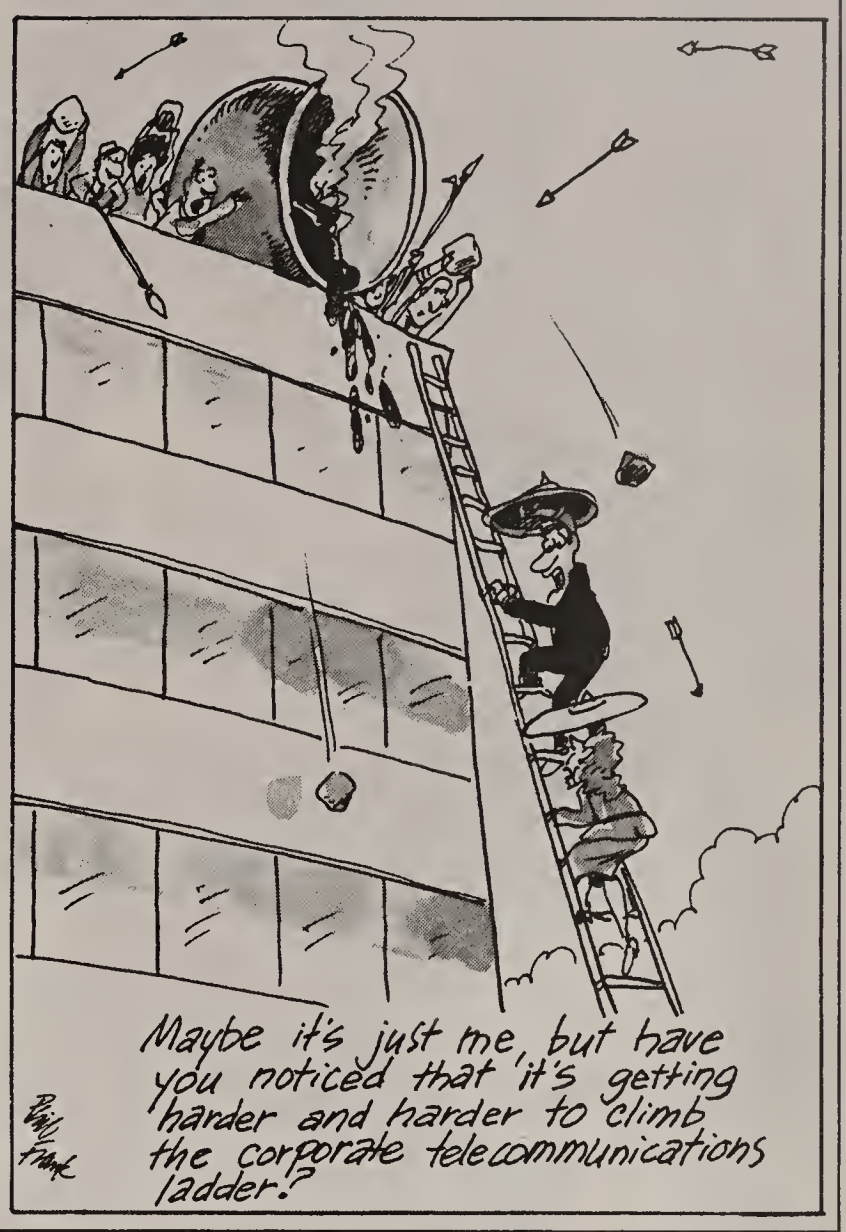
Johnston-Turner is a principal with Northeast Consulting Resources, Inc., a Boston consulting collaborative providing user and vendor support on a range of communications and information technology strategies.

LIKE ALLIGATORS IN A SWAMP, unforeseen problems can really put the bite on a communications operation. Many managers find themselves wrestling with these networking reptiles every day.

If you've survived an "alligator attack," share it with our readers by calling Susan Collins, assistant features editor, at (508) 820-7413 or fax your idea to us at (508) 820-3467. Alligators should be 1,200 words in length and submitted either on disk or via modem.

TELETOONS

BY FRANK AND TROISE



LETTERS

Retaining skilled staff

Your feature article about dealing with shortages of skilled network personnel ("New methods help ease net worker shortages," *NW,* Oct. 29) was excellent. However, let me suggest another solution that was overlooked.

Managing for improved retention of current staff is perhaps the ultimate staffing solution. Holding on to current employees is generally easier and less expensive than finding new ones.

The emphasis on recruitment-oriented solutions is the tried-and-true approach. But as the article noted, the supply of good people is so small that even the biggest ads and the most enticing offers won't necessarily result in new hires.

No manager should ever take turnover as a given. Careful analysis of turnover data and exit interview information usually turns up some clues about ways to reduce turnover.

In addition, a review of every element of the staffing process, from how ads are placed to how careers are managed, highlights other reasons why people aren't staying at their job and succeeding. And putting new or added emphasis on management accountability for retention is another key step.

If companies don't make retention of current staff as high a priority as recruitment, they will continue to feed a revolving-door staffing problem that is costly and disruptive. When good people leave unnecessarily, a lot of expertise goes with them. We should start paying as much attention to the problem of losing employees as we do to losing customers. To succeed, companies need to keep both.

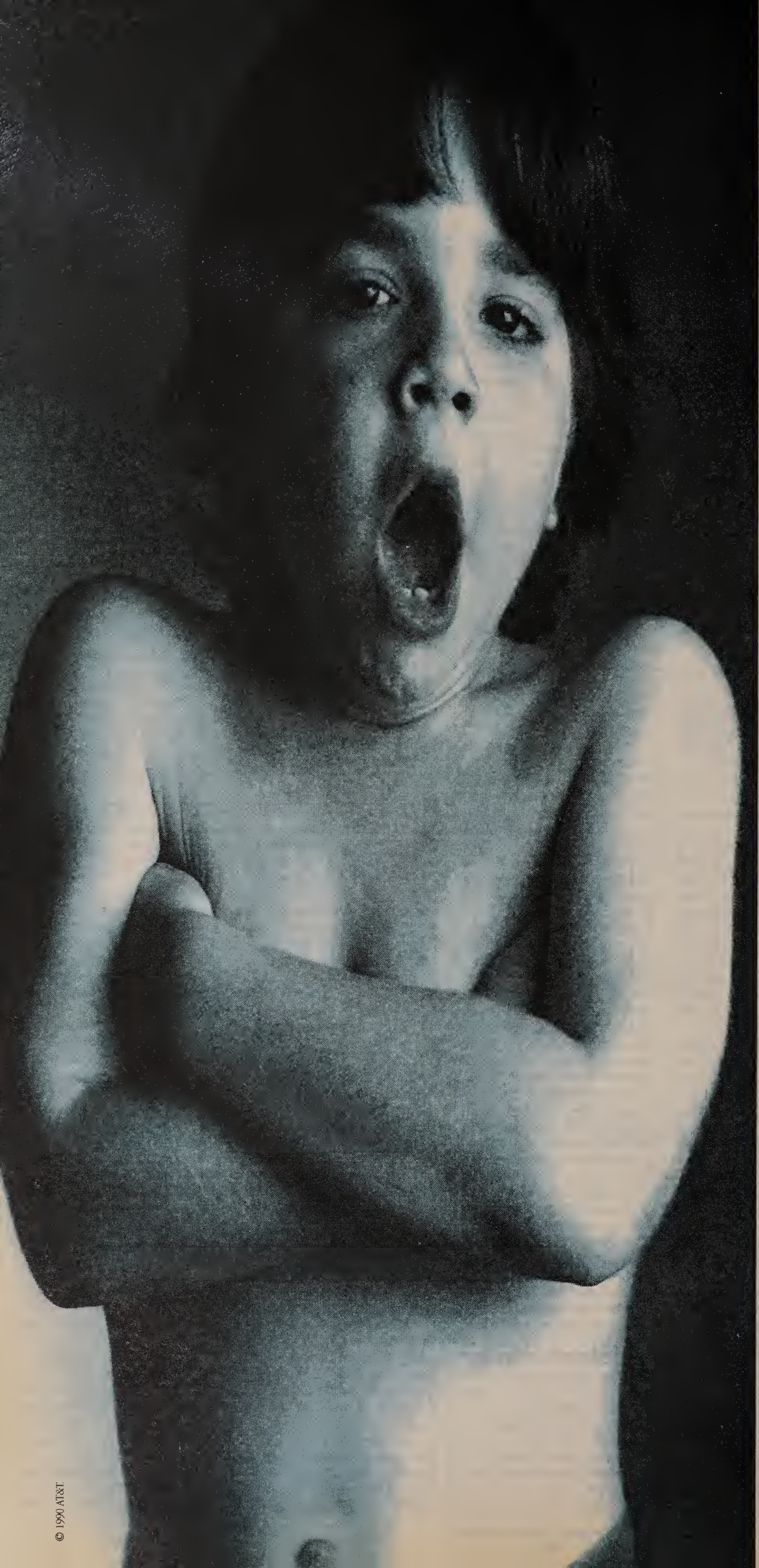
Gil Gordon
President
Gil Gordon Associates
Monmouth Junction, N.J.

(more letters on page 55)

Network World *welcomes letters from its readers.*

Letters should be typed and double-spaced. Mail them to Editor, Network World, *161 Worcester Road, Framingham, Mass. 01701.*

Letters may be edited for space and clarity.



I'm sitting in a

about my son

above our house

I told him that

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and my little boy

MAINTENANCE

come up with

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switch is devoted

for the tip and he

fly right, Dad,

for me going to

corner office on a round planet and I'm thinking and how last night he looked at the crescent moon and said, "Daddy, broken moon, broken moon." And the moon would be fixed soon by a silent and unseen the PBX that I bought for the corporation from company might not be fixed any time soon at all, who is only five said, "Dad, AT&T has a REMOTE lab in Denver set up to detect any problems that might their DEFINITY® System and fix them before they You see, Dad, a full 1/3 of the memory of a DEFINITY entirely to self-maintenance." And I told him thanks looked up at me and said, "Straighten up and because no silent and unseen hand is going to pay college."

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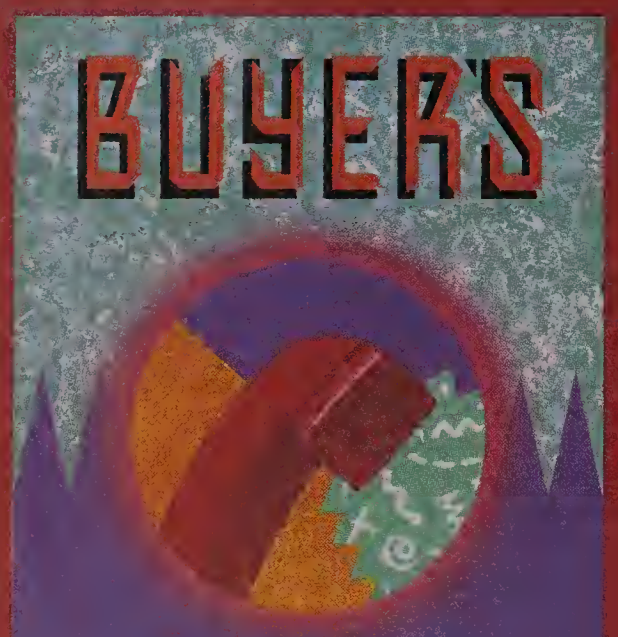
TELECOM



ISDN CUSTOMER PREMISES EQUIPMENT

All quiet on

CONTINUED FROM PAGE 1
ments to their product lines.

In short, the U.S. market for ISDN customer premises equipment has not grown at the rate that equipment manufacturers were predicting a year or two ago.

A spokesman for one Midwestern manufacturer of ISDN Basic Rate Interface (BRI) adapter cards for personal computers confides that its sales to date have all been in quantities of one or two and purchased primarily "for evaluation purposes." What's more, the vendor has sold as many cards to ISDN service providers and competing ISDN equipment manufacturers as it has to end-user organizations.

The high end of the market, where ISDN Primary Rate Interface (PRI) is used to access local or long-haul network services, is progressing at an equally lethargic pace.

AT&T's PRI service, commercially available for more than a year, has garnered about 250 to 300 customers, with a total of approximately 500 PRI access connections, according to spokespeople from a local telephone company and an equipment manufacturer, both of whom requested anonymity.

AT&T would neither confirm nor deny the numbers. But if the figures are accurate, they represent only a small percentage of AT&T's major customers that could potentially use ISDN's PRI — rather than plain-old T-1 — to access long-distance services.

An additional negative note: Melville, N.Y.-based NEC Ameri-

Mier is president of Mier Communications, Inc., a Princeton Junction, N.J.-based network consultancy that specializes in customized protocol analysis and planning.

the ISDN CPE front

ca, Inc. developed a PRI for the NEAX 2400 private branch exchange product line more than a year ago.

NEC certified the compatibility of its interface with both AT&T and Northern Telecom, Inc. central office switches, as well as with the PRI services of AT&T and US Sprint Communications Co. But as of Oct. 1, not a single NEAX user had purchased or installed the PRI to connect to a public carrier's ISDN service, according to Anthony DiMaso, director of strategic marketing at NEC.

Stripped down

ISDN customer premises equipment development in the U.S. has not completely stagnated. Vendors have been reexamining user requirements with an eye toward reassessing and reducing their own manufacturing costs. To the user, this means that new models of ISDN terminal adapters and telephone sets, for example, are coming with smaller and smaller price tags but also with correspondingly reduced functionality.

The first Buyer's Guide chart, beginning on page 45, profiles the capabilities and characteristics of the latest ISDN terminal adapters, phone sets and adapter boards, all products that can loosely be called "portable" ISDN customer premises equipment.

Most of this portable equipment incorporates and supports the ISDN BRI S/T interface and should, theoretically, connect to any ISDN BRI PBX, switch or service via network termination-1 (NT-1), the first device on the customer premises end of the local loop.

Although the products listed in the chart are considered portable, it is doubtful that some of these products really could be unplugged from one BRI connection and plugged into another supported by a different PBX or switch vendor.

For example, AT&T's four BRI adapters — two stand alone and two personal computer plug-in boards — specifically support BRI connections to AT&T's 5ESS central office switch and AT&T's Definity Generic 2 PBX.

The AT&T adapters have not been tested with Northern Telecom's PBX or central office switches, and AT&T isn't saying whether they would work in any capacity when connected to such a switch. The AT&T PC/ISDN

(continued on page 43)

CHART • GUIDE

Buyer's Guide charts comparing ISDN adapters, phone sets, PBXs and voice/data switches, as well as concentrators, gateways and multiplexers, start on page 45.

Prices are falling but not fast or far enough to suit potential users.

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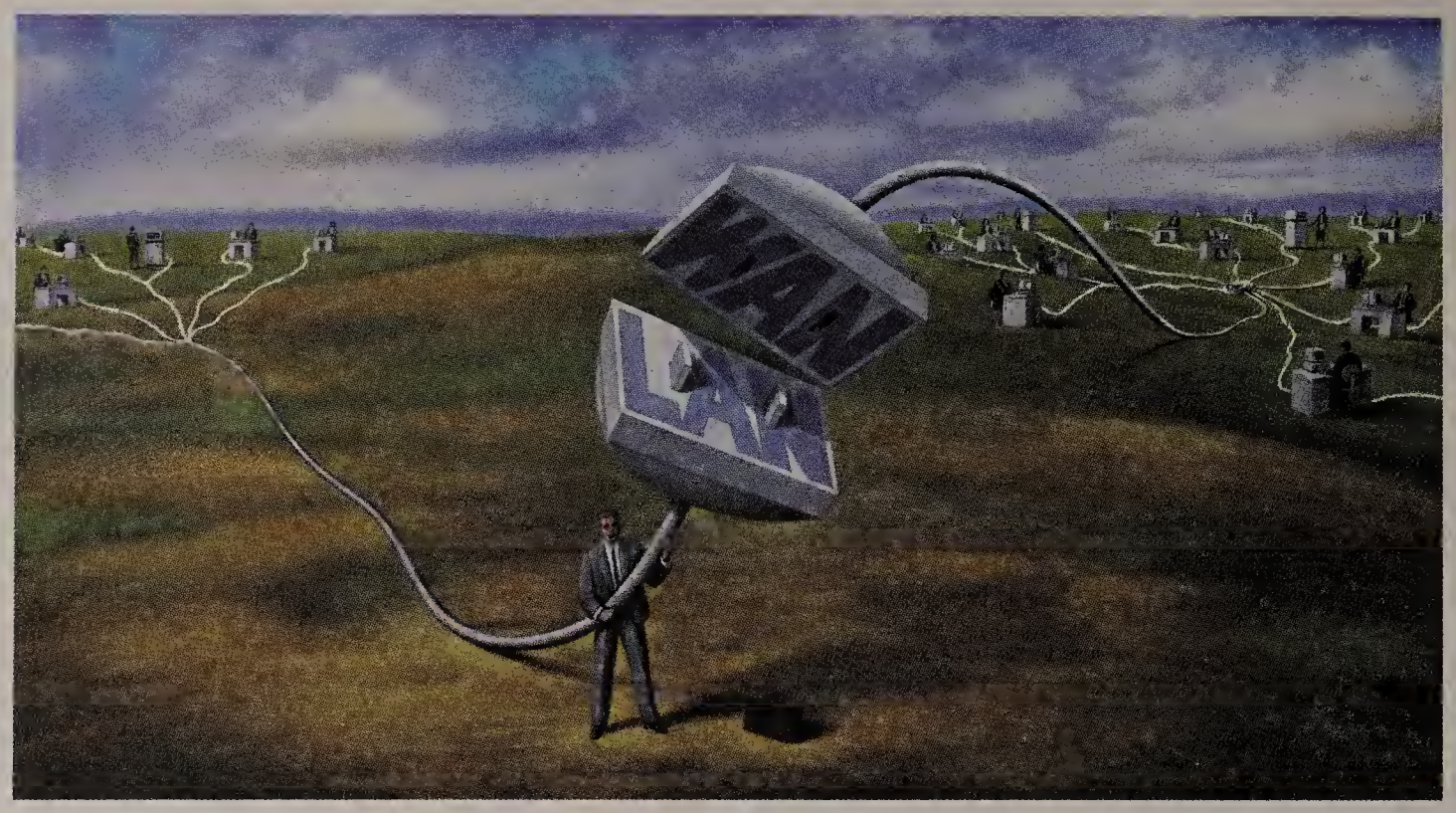
See The FAXNeT Form on Page 33



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See The FAXNeT Form on Page 33

(continued from page 39)
Platform is designed to work with AT&T's ISDN BRI phone sets. However, these phone sets definitely do not work with Northern Telecom's ISDN switches.

Similarly, the latest generation of Northern Telecom ISDN terminal customer premises equipment is specifically designed to work with Northern Telecom's DMS-100 central office switch and the SL-100, enhanced versions of which are now collectively marketed along with enhanced versions of the SL-1 PBX line as the Meridian 1. Whether any of these would work with AT&T's switches is unknown.

So while ISDN station equipment from AT&T and Northern Telecom employs "standard" ISDN interfaces at the physical and electrical levels, differences at the signaling level and in the implementation of software services continue to confound users' hopes for true portability of ISDN customer premises equipment.

Dual switch support

Most of the other adapters listed in the chart on page 45 work with BRI service provided via either a DMS-100 or 5ESS central office switch. However, each adapter's ability to work with either switch is constrained to the version of switch software for which it was developed and against which it was tested.

Codex Corp.'s 8860 ISDN terminal adapter, for example, features data connection compatibility only with the latest software that runs on AT&T's 5ESS, called Generic 5E6, and Northern Telecom's DMS-100, called BCS 31.

The vintage of central office switch software that an ISDN adapter supports makes a difference. For example, some adapters are compatible with 5ESS switches running software up through Generic 5E4.2. However, the next software release, Generic 5E5, added support for an ISDN BRI feature called passive bus.

The passive bus is the ISDN equivalent of the old party line connection, allowing up to eight ISDN BRI stations (per CCITT specifications) to share a single 2B+D BRI channel. Only two circuit-switched, B channel calls are supported at a time, and any others attempting to call are blocked.

The precise reaction to blocking varies from one ISDN adapter or phone set to another. A caller using Fujitsu America, Inc.'s SRS-2000 digital phone set, for example, will get a message saying "B channel busy."

Studies by AT&T and other telecommunications equipment manufacturers have shown that Americans don't like to be blocked, whereas Europeans are more tolerant. Therefore, the ISDN passive bus has been more widely accepted in Europe for switched voice calls. It does, however, have a place in U.S. ISDN networks, primarily for the connection of about a half-dozen data devices.

Except for data connections that require high-speed (56K or 64K bit/sec) or synchronous channels, which must be circuit-switched on one of the BRI's B channels, virtually any number of low-speed, asynchronous data devices can be multiplexed on the same D channel. However, the aggregate data traffic cannot exceed the 16K bit/sec throughput capacity of the D channel.

Northern Telecom's ISDN switches now support only a limited passive bus capability. Currently, no more than two B channel devices, such as phone sets, can connect with a single BRI link to a Northern Telecom central office switch. However, up to eight are supported when both B and D channels are used.

Rate adaption

Each of the ISDN adapter vendors included in the accompanying charts was asked to identify the method of rate adaption supported for carrying a subrate (less than 56K bit/sec) data channel within one of the circuit-switched ISDN B channels. The B channel has a 64K bit/sec capacity, so bits must be added to any lower data rate in order to make up the difference. This information is shown in the "Rate adaption" column in the first chart.

Rate adaption is not inherently a responsibility of the telephone network or ISDN switches because the network is only obligated to correctly set up a clear 64K bit/sec B channel between calling and called parties. Rate adaption is thus an adapter issue; unless adapters at both ends of a circuit-switched ISDN connection use the same rate adaption technique in exactly the same way, any attempted data connections will be aborted.

Rate adaption is not necessary for asynchronous data that is multiplexed in packet form on the D channel. A CCITT-specified technique for performing this multiplexing and packetizing, called X.30, is generally accepted and widely implemented.

There is a general consensus in the industry that the CCITT's V.120 specification is the emerging rate adaption standard of choice for ISDN adapters. In the U.S.,

(continued on page 49)

> The passive bus is the ISDN equivalent of the old party line connection, allowing up to eight ISDN BRI stations to share a single 2B+D BRI channel.
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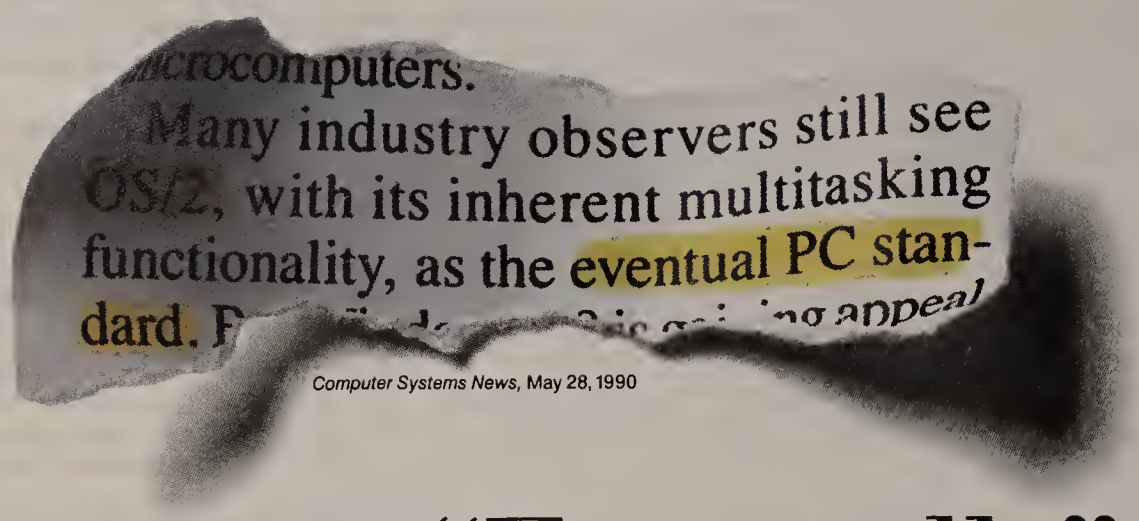
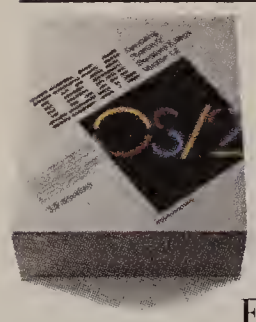


"Eventually" is here.

Announcing The OS/2 You've Been Waiting For.

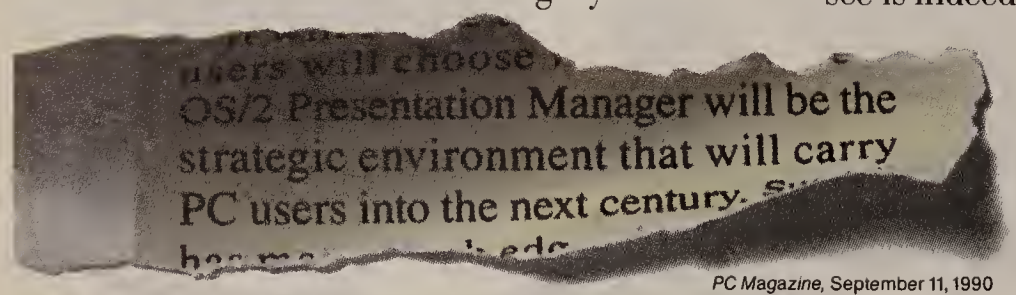


For quite some time, the press has been writing about the move everyone will want to make to OS/2.® Eventually.

Well, all at once OS/2 1.3 has made OS/2 the operating system it was meant to be—the one you'll want to move to right here and now.

OS/2 Loses A Little Weight.

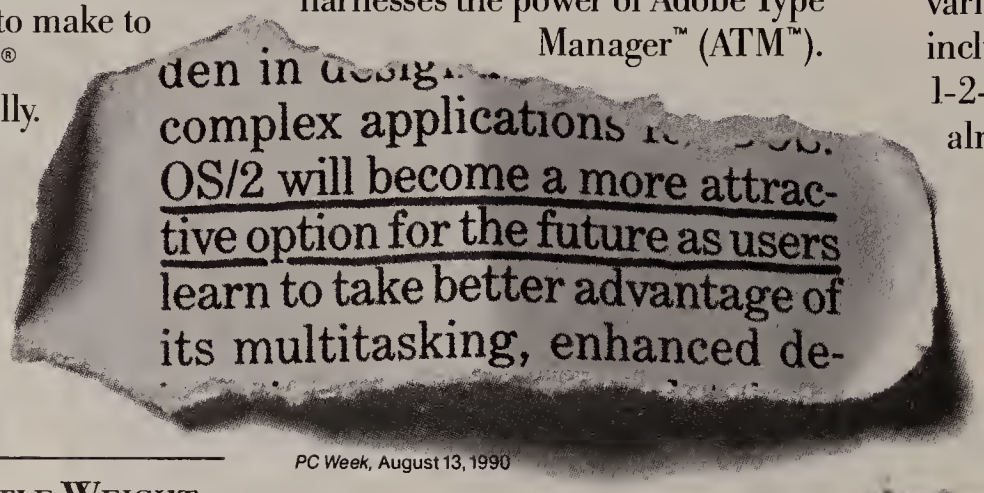
For starters, OS/2 has lost some of its appetite for memory. In fact, now you can make the move to OS/2 1.3 with as little as two megabytes on your system. What's more, this streamlined version leaves more room for applications and will offer some users a substantial performance increase in many system functions.



Functionality. Functionality. And Did We Mention Functionality?

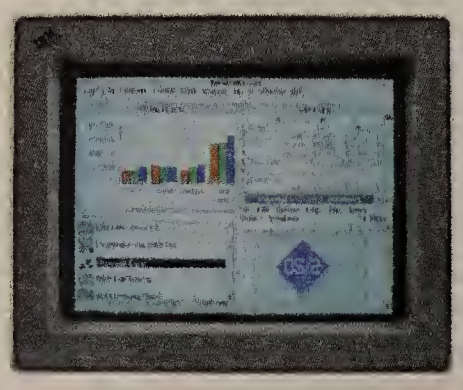
Multitasking. Seamless connectivity. The ability to run applications larger than 640K. DOS® compatibility. All these features have made OS/2 appealing in the past, but new features have catapulted OS/2 into the here and now.

For instance, now OS/2 1.3 harnesses the power of Adobe Type Manager™ (ATM™).



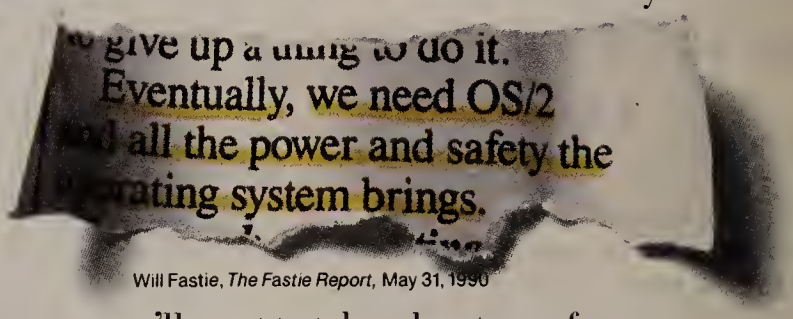
With this new feature, the quality of screen fonts has improved dramatically, giving you a true WYSIWYG capability so what you see is indeed what you get. ATM also gives OS/2 more flexibility in document creation by supporting a wide range of outline fonts.

Of course, what good is all this without printer support? Not much. So OS/2 1.3 has improved and expanded its printer support to include drivers for almost all popular printers.



Business Is Booming.

Now that OS/2 is moving forward, so are software developers. Every day, more and more applications are joining the growing pool of available OS/2 software. In fact, a variety of major business programs, including Aldus® PageMaker,® Lotus® 1-2-3/G® and Microsoft® Excel, have already made the transition to OS/2. These, along with many others, have been redesigned to go beyond DOS memory limits and take advantage of OS/2's intuitive graphical interface—Presentation Manager.™



It's been said that eventually you'll want to take advantage of everything OS/2 has to offer. Well, wait no more because "eventually" is here.

For more information on what OS/2 can do for you here and now, or to get details on a no-charge upgrade to Version 1.3, contact your IBM Authorized Remarketer or marketing representative.

OS/2 can do!

IBM

ISDN terminal adapters, phone sets and adapter boards (continued on page 46)

Company	Product Name	Description	Device interfaces	Network interfaces	Summary of ISDN features	Rate adaption	ISDN switch/service compatibility	Price
AT&T Business Communications Systems Bridgewater, N.J. (201) 658-6000	ISDN 7500 Data Module	Terminal adapter for connecting data devices to ISDN BRI interface/service; no voice/telephony capability; stand-alone or rack-mountable unit; external power supply for stand-alone unit; shared power supply for rack-mountable unit	RS-232 for asynchronous data to 19.2K bit/sec; 1 RS-232 port provided with basic unit; optional additional board for synchronous data (including RS-366 Automatic Calling Unit interface) and second RS-232 port; optional additional board for V.35 interface	ISDN BRI S/T interface	D-channel packet data	DMI Mode 2 for data rates up to 19.2K bit/sec; DMI Mode 1 for 56K bit/sec data; DMI Mode 0 for 64K bit/sec	AT&T Definity Generic 2; AT&T 5ESS (5E4.2, 5E5 software)	$875
	AT&T PC/ISDN Platform	Adapter board; full-sized coprocessor card for 8-bit IBM PC XT and AT bus; DOS Version 2.0 or later required; includes programming interfaces, designed for integrated voice/data applications	Analog interface for handset or headset; second BRI S/T interface for connection of ISDN phone set (not included); includes two device driver-level APIs: one for voice functions between platform and voice applications, plus Expanded Interrupt 14 interface for data exchange between the board and processor; both interfaces can be used simultaneously, and are accessible with most programming languages	Two ISDN BRI S/T interfaces provided: one connects to the switch/ISDN service, the other is for attachment of an ISDN phone (not included)	Data: D channel for packet-switched data (via X.31 to AT&T 5ESS central office only); PAD and X.25 facilities for D-channel data, stream mode; data on either or both B channels; Voice: Supports AT&T 750X ISDN voice terminals; voice on either B channel; telephony features include call conferencing, hold, transfer and drop; DTMF generation	DMI Mode 2 for circuit-switched asynchronous data to 19.2K bit/sec in stream mode; DMI Mode 3 for synchronous data to 56K or 64K bit/sec, stream or block mode, single logical link	AT&T Definity Generic 2; AT&T 5ESS (5E4.2, 5E5 software)	$1,395
	Personal Computer TA Card 1000	Adapter board; full-slot card for 8-bit IBM PC XT, AT or EISA bus, runs with DOS Versions 2.0 and 3.3; supports any off-the-shelf PC COM-port software (including Hayes Microcomputer Products, Inc. compatible) and, optionally, as a LAN gateway, any NETBIOS-compatible software	RJ-11 for analog phone device	ISDN BRI S/T interface (RJ-45)	B channel for voice, D channel for data; telephony features supported include call waiting, hold, conference, transfer (ISDN telephony features per 5ESS)	NA (data only on D channel)	AT&T 5ESS (5E5 or 5E6 software)	$500; NETBIOS support, $100
	PACKIT/6 ISDN PAD	Terminal adapter; supports connection of as many as 6 data devices to an X.25 network via the D channel of a single ISDN BRI interface; can consolidate up to 6 modem links onto 1 line; unit responds to Hayes Smartmodem interface for communications software	6 RS-232 user ports and 1 RS-232 port for administration	ISDN BRI S/T interface	Individual device speeds to 19.2K bit/sec supported; all data is packetized using X.25 and multiplexed onto the 16K bit/sec BRI D channel	NA (no data on B channels)	AT&T 5ESS (5E5 or 5E6 software)	$1,995
CMC Rockwell Santa Barbara, Calif. (805) 968-4262	CMC-1800	Adapter board providing ISDN PRI for VMEbus systems running Unix operating systems (SunOS and System V); 8-, 16- or 32-bit data transfer modes; ISDN Layers 1, 2 and 3 software on-board; can interface a switch or PBX to AT&T PRI ISDN service	RJ-48C and DSX-1 interface to PBX and external T-1 CSU; RS-232 port (DB-9 connector) for diagnostics; additional interface supports V.35/RS-422; B- and D-channel drivers for Unix	PRI to AT&T long-distance network services	Per AT&T ISDN PRI; supports 64K bit/sec clear channel, Accunet switched 56K bit/sec, switched 384K bit/sec (restricted and clear), Megacom, Megacom 800, AT&T SDN services; supports European 30 B+D format, as well as H0, H1, H11 and H12 hyperchannels	V.120 and a CMC-proprietary HDLC rate adaption	AT&T ISDN PRI Service	$3,995; AT&T PRI software, $695
Codex Corp. Mansfield, Mass. (508) 261-4000	8860 ISDN Terminal Adapter	Terminal adapter; provides two ports for data-only connection to an ISDN BRI service	RS-232/V.24; or, via optional intelligent port adapters, V.35 or X.21; RS-232 control-terminal port (asynchronous to 9.6K bit/sec, Digital Equipment Corp. VT-100 emulation)	ISDN BRI S/T interface; also supports multipoint passive bus connection	Asynchronous (to 38.4K bit/sec) or synchronous (to 64K bit/sec) data; integral multiplexer can combine two data streams over 1 B channel; 10-number internal directory	V.110; X.30	AT&T 5ESS (5E4.2, 5E5 and 5E6 software); Northern Telecom DMS-100 (BCS-31 software); the central office switch used in France	$1,995
DigiBoard, Inc. Saint Louis Park Minnesota (612) 922-8055	ISDN tel/adapter	Adapter board for IBM PC XT or AT; plug-in card for DOS system supports integrated, simultaneous telephony, file transfer, terminal-emulation applications; analog phone set adapter; optional software supports personal computer as an ISDN gateway on a NETBIOS LAN	Supports personal computer COM1 and COM2 ports; serial port; Interrupt 14; optional NETBIOS software interface; includes proprietary API; performs multitasking with DOS	ISDN BRI S/T interface	Supports AT&T 5ESS full supplemental services (call hold, conferencing, transfer and drop), display, key system operation, multiple call appearance, message waiting; 6-port call conferencing; on-demand B-channel packet-switched data calls; as a gateway, it supports as many as 20 LAN stations using X.25, composite X.25 data transmission to 120K bit/sec over a maximum of 4 PC COM ports (using Interrupt 14)	Proprietary for circuit-switched data; X.25 for packet data	AT&T 5ESS (5E4.2, 5E5 and 5E6 software); service tested with Bell Atlantic Corp., BellSouth Corp., Nynex Corp., Pacific Bell, Pacific Telesis Group, US West, Inc.	$1,495; $595 for LAN gateway configuration option (1)
Fujitsu Network Switching of America San Jose, Calif. (408) 432-1300	SRS-2000 Digital Set	ISDN phone set; features 160-character LCD display, 4 soft keys, speakerphone; optional snap-in data module; plug-in cartridge for configuration/software changes; powered either by NT-1 (not included) or own AC adapter	RS-232 port (DB-25 connector), supports AT modem command set call origination, asynchronous or synchronous data to 19.2K bit/sec	ISDN BRI T interface; supports multipoint, passive bus connection	Data: B-channel circuit-switched and D-channel packet-switched data service; 56K or 64K bit/sec B-channel bearer capability; Voice: speakerphone, speed dialing; AT&T application processor support; DTMF support for non-ISDN calls; ISDN telephony: call hold, conferencing, drop and transfer; full key system functionality, 1-button access to Centrex features, unanswered call logging and display feature	V.120 and V.110, selectable	AT&T 5ESS (5E6 software)	$810 voice-only set; $990 with optional data support
	SRS-300 TA	Terminal adapter; supports 2 asynchronous or synchronous RS-232 data devices, effectively replacing 2 modem links; plug-in cartridge for software upgrades; powered either by NT-1 or by own AC power adapter	Two RS-232 ports (DB-25 connectors); call origination by AT modem command set, via X.28 or preset	ISDN BRI T interface; supports multipoint, passive bus connection	B-channel circuit-switched and D-channel packet-switched data service; asynchronous or synchronous data to 19.2K bit/sec; 56/64K bit/sec bearer service; topology (point-to-point or passive bus) programmable via keyboard	V.120, V.110, selectable	AT&T 5ESS (5E6 software)	$725
	SRS-400 TA	Terminal adapter; supports 2 asynchronous or synchronous RS-232 data devices, optional analog phone interface; plug-in cartridge for software upgrades; powered either by NT-1 or by own AC adapter	Two RS-232 ports (DB-25 connectors); call origination by AT modem command set, via X.28 or prestored; optional analog interface (RJ-11)	ISDN BRI T interface; supports multipoint, passive bus connection	B-channel circuit-switched or packet-switched (with or without PAD protocol conversion) service; D-channel packet-switched service; asynchronous or synchronous data to 19.2K bit/sec; 56/64K bit/sec bearer service; topology (point-to-point or passive bus) programmable via keyboard	V.120, V.110, selectable	AT&T 5ESS (5E6 software); Northern Telecom DMS-100 (BCS29 software)	$1,250 to $1,565, depending on configuration (PAD support, optional analog port)

AC = alternating current
API = application program interface
BRI = Basic Rate Interface
CSU = channel service unit
DCE = data communications equipment
DDS = digital data services
DMI = AT&T's Digitally Multiplexed Interface
DTE = data terminal equipment
DTMF = dual-tone multifrequency
EIA = Electronic Industries Association
EISA = Extended Industry Standard Architecture
HDLC = High-Level Data Link Control
ISA = Industry Standard Architecture
LAP B = Link Access Procedure B
LAP D = Link Access Procedure D
MCA = Micro Channel Architecture
NA = not applicable
NETBIOS = Network Basic I/O System
NT-1 = network termination 1
NT-2 = network termination 2
PRI = Primary Rate Interface
SDN = AT&T's Software-Defined Network

FOOTNOTE:
(1) See the charts for ISDN-capable PBXs and voice/data switches on page 49 and ISDN concentrators, gateways and multiplexers on page 55.

This chart includes a representative selection of vendors of ISDN terminal adapters, phone sets and adapter boards. Some vendors not included may offer a full range of competitive products.

SOURCE: MIER COMMUNICATIONS, INC., PRINCETON JUNCTION, N.J.

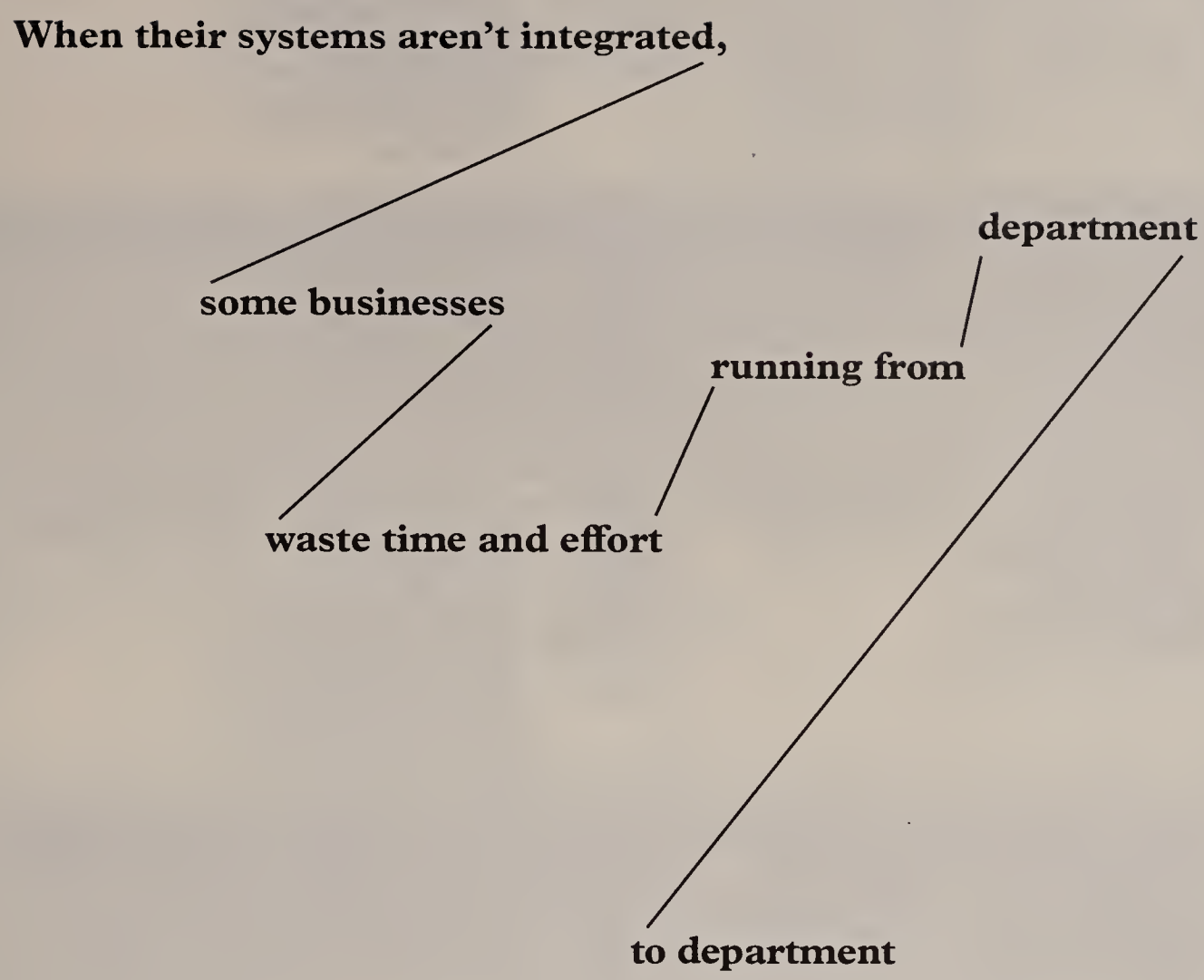
ISDN terminal adapters, phone sets and adapter boards (continued on page 48)

Company	Product Name	Description	Device interfaces	Network interfaces	Summary of ISDN features	Rate adaption	ISDN switch/service compatibility	Price
Fujitsu Network Switching of America (continued)	SRS-410 TA	Terminal adapter; supports 2 high-speed synchronous, V.35 devices (videoconferencing equipment, Group IV fax, synchronous X.25 devices); optional analog phone interface; plug-in cartridge for software upgrades; powered either by NT-1 (not included) or by own AC adapter	Two V.35 ports (standard 34-pin connectors); optional analog phone port (RJ-11)	ISDN BRI T interface; supports multipoint, passive bus connection	B-channel circuit-switched or packet-switched (with or without PAD) service; synchronous data rates at 48K, 56K or 64K bit/sec; 56K/64K bit/sec bearer capability; topology (point-to-point or passive bus) programmable via keyboard	V.110	AT&T 5ESS (5E6 software); Northern Telecom DMS-100 (BCS 29 software)	$1,340 to $1,720, depending on options
Gandalf Data, Inc. Wheeling, Ill. (708) 459-9348	TA-1	Terminal adapter; supports 2 data devices (RS-232 standard, other high-speed interfaces available); stand-alone (using own AC adapter) or rack-mountable (powered from rack); interactive user front panel with LCD to set up configuration, call setup	Two ports, which can be RS-232 (DB-25 connectors), RS-530, RS-422/423	ISDN BRI S/T interface	Synchronous data transfer to 56K/64K bit/sec via B channels; storage for 10 directory numbers, unit and call parameters front-panel configurable, autoanswer, self test	V.110	AT&T 5ESS (5E4, 5E5 or 5E6 software); Northern Telecom DMS-100 (BCS 29 and later software); British Telecommunications PLC System X (BTNR 191 software); meets European NET 3 specifications	$1,095 (RS-232 interfaces); $1,295 (V.35)
Hayes Microcomputer Products, Inc. Atlanta (404) 449-8791	ISDN PC Adapter	ISDN adapter card for IBM PC XT or AT running DOS 3.1 or later, with hard disk and 640K-byte RAM (recommended); analog phone port; includes Hayes API (ISDNBIOS) for program development	PC COM port access; Hayes ISDN API or AT command set support; jack for analog phone device	ISDN BRI S/T interface (RJ-45); supports multipoint passive bus connection with DMS-100 switch	Circuit- or packet-switched data via B channel, packet-switched data via D channel (up to 8 sessions, dependent on personal computer memory); X.25 PAD function (included) on B or D channel; 56K or 64K bit/sec (unrestricted) data transmission; circuit-switched voice via 1 B channel; telephony features include call conferencing, drop, transfer, hold, retrieve and forwarding, calling line identification (incoming and outgoing), in-band B-channel DTMF, speed calling	V.120, X.25 (for packet-switched data)	AT&T 5ESS (5E4.2 software), Northern Telecom DMS-100 (BCS 29 software); telephony features are switch- and software-version dependent	$1,599 (estimated retail)
IBM Armonk, N.Y. (914) 934-4000	IBM 7820 ISDN Terminal Adapter	Terminal adapter, stand-alone; supports attachment of two synchronous data devices via any of several interfaces; integrated network management via NetView/PC; uses own AC adapter	Two interfaces, can be any mix of RS-232 (V.24), V.35 or X.21; no voice/telephony capability	ISDN BRI S/T interface	Synchronous data rates of 4.8K, 9.6K and 19.2K bit/sec supported via RS-232; 4.8K, 9.6K, 48K and 64K bit/sec via X.21; and 48K, 56K and 64K bit/sec via V.35; a plug-in adapter board version of the IBM 7820 is available in France, Germany and Japan (for PS/2 with MCA)	V.110	AT&T 5ESS (5E4.2 software), Northern Telecom DMS-100 (with restrictions); also compatible with public ISDN services in Belgium, France, Germany, Japan and Singapore	$1,625 basic unit, plus either $525 for RS-232 or X.21 interfaces, or $630 for V.35
ICL North America Stamford, Conn. (203) 968-7200	I^3	Plug-in ISDN adapter card for IBM PC AT, EISA or MCAbus systems (different adapter versions) running IBM's OS/2 Version 1.1 or later with a minimum of 5M bytes of RAM and hard disk; includes ISDN telephone, hardware, software (runs as an OS/2 multitasking application, includes API) and documentation	Connector for vendor's ISDN phone set	ISDN BRI S/T interface (RJ-45)	Data to 64K bit/sec on either B channel; X.25 packet-switched support for up to 16 sessions, permanent or on-demand X.25 connections, or LAP B or SDLC protocols via B channel (LAP D on D channel); asynchronous terminal-emulation support; ISDN telephony features include key system support, speakerphone, supplemental services (call hold, conferencing and forwarding), up to 64 call appearances	V.120	AT&T 5ESS (5E4, 5E5 software), Siemens Information Systems, Inc. EWSD (software Rev. 5.0), Northern Telecom DMS-100 (BCS29 or later software), British Telecom System X	$2,195 (AT, EISA and MCA versions)
NCR Corp. St. Paul, Minn. (612) 638-7777	NCR ISDN PC Terminal Adapter	Plug-in board adapter for IBM PC or PC AT (ISA)-bus computer running DOS or OS/2 with hard disk; 8- or 16-bit slot, (8-bit data transfer); optional software (for OS/2 only) supports voice/data transmission, ISDN-feature phone capabilities, multitasking, fast file transfer; optional separate power supply for phone when personal computer is off	RJ-11 for external analog phone set, RS-232 for additional asynchronous device	ISDN BRI S/T interface (RJ-45); also supports multipoint passive bus connection	File transfer at 64K bit/sec via NCR software on OS/2 system (provides LAN Manager application access, includes OS/2 device-driver API); for DOS or OS/2, an on-board COM port and Hayes AT command emulation supports transmission via existing asynchronous modem software to 38.4K bit/sec (DOS) or 19.2K bit/sec (OS/2); telephony features (per AT&T 5ESS) include call hold, drop, conferencing and transfer, electronic directory service, key system operation and call forwarding	V.110 and V.120 supported; also supports bit robbing for transmission over 56K bit/sec DDS lines; all three are supported via COM-port interface, RS-232 interface and are available to system running NCR's Comm Server software	AT&T 5ESS (5E4 software)	$1,695 (hardware only); Voice/Data Manager software (runs on OS/2 Version 1.1 with Presentation Manager) costs $195
Newbridge Networks, Inc. Herndon, Va. (703) 834-3600	1600-Series MainStreet Terminal Adapter	Terminal adapter for up to 2 synchronous or asynchronous data devices; different data device interfaces available; optional U interface; no telephony capabilities; separate power supply	Two ports, either RS-232/V.24 (Model 1601), X.21 or RS-449 (Model 1602) or V.35 (Model 1603), plus separate RS-232 maintenance port	ISDN BRI S/T or, with NT-1 interface option, the 2-wire ISDN U interface (directly to the central office via a local loop)	DTE or DCE port configuration; synchronous or asynchronous data rates to 19.2K bit/sec via RS-232, synchronous data rates at 48K, 56K or 64K bit/sec via RS-449, X.21 or V.35; B-, D-channel data services as offered by AT&T or Northern Telecom; autobaud and autocharacter detection	V.110 or X.30 (Model 1601); X.30 only (Model 1602); V.110 only (Model 1603)	AT&T 5ESS, Northern Telecom DMS-250; ISDN central office switch used in Australia	$1,150 (configured with an S interface)

AC = alternating current
API = application program interface
BRI = Basic Rate Interface
CSU = channel service unit
DCE = data communications equipment
DDS = digital data services
DMI = AT&T's Digitally Multiplexed Interface
DTE = data terminal equipment
DTMF = dual-tone multifrequency
EIA = Electronic Industries Association
EISA = Extended Industry Standard Architecture
HDLC = High-Level Data Link Control
ISA = Industry Standard Architecture
LAP B = Link Access Procedure B
LAP D = Link Access Procedure D
MCA = Micro Channel Architecture
NA = not applicable
NETBIOS = Network Basic I/O System
NT-1 = network termination 1
NT-2 = network termination 2
PRI = Primary Rate Interface
SDN = AT&T's Software-Defined Network

This chart includes a representative selection of vendors of ISDN terminal adapters, phone sets and adapter boards. Some vendors not included may offer a full range of competitive products.

SOURCE: MIER COMMUNICATIONS, INC., PRINCETON JUNCTION, N.J.



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ISDN terminal adapters, phone sets and adapter boards (continued from page 46)

Company	Product Name	Description	Device interfaces	Network interfaces	Summary of ISDN features	Rate adaption	ISDN switch/service compatibility	Price
Northern Telecom, Inc. Richardson, Texas (214) 437-8000	Universal Terminal Adapter M5000TP-1	Stand-alone terminal adapter for voice/data applications; supports 1 data device via either RS-232 or V.35 and 1 analog phone device; separate power supply	RS-232 or V.35 (DB-25 connector), RJ-11 for analog phone device	ISDN BRI S/T interface (RJ-45)	X.25 packet-switched data via B or D channel; choice of circuit-switched or X.25 packet-switched data on one B channel, circuit-switched voice on other B channel; accepts AT commands; includes X.25 PAD for B- or D-channel data; DTMF, keyboard or AT modem command set call setup; telephony features include (via Meridian PBX) conference calling, call forward, transfer and hold, last number redial and speed calling	V.120 or Northern Telecom T-link, selectable by user for circuit-switched B-channel data on a per-call basis	Northern Telecom Meridian 1 (SL-100 class) PBXs and DMS central office switches	$1,400
	M5317T ISDN Digital Telephone	ISDN voice or voice/data phone set; either configured for data device attachment or via optional add-on data module; 80-character display, speakerphone, programmable soft keys; may be powered by NT-1 or PBX, or via own power supply	If configured for data, an RS-232 interface for circuit-switched data (modem substitute)	ISDN BRI S/T interface; also supports multipoint passive bus connection (currently limited to two B-channel users; up to 8 via B and D channels)	If optionally configured for data, B-channel support of asynchronous, full-duplex, circuit-switched data at up to 19.2K bit/sec; telephony features include call forward, waiting and park, 3-way calling, call back queuing, intercom, last number redial and message waiting	Versions 1 and 2 of Northern Telecom T-link protocol	Northern Telecom DMS series of switches (BCS 29 and later software) and Meridian 1 (SL-100 class) PBXs; functional or stimulus signaling supported for basic voice call control	$625 voice-only set; $675 for voice/data set (preconfigured for data); $175 data option pack for circuit-switched data
	M5209T ISDN Digital Telephone	ISDN voice or voice/data phone set; either preconfigured for data or via optional add-on data module; 48-character display, 9-line appearance and feature-activation keys; field-replaceable ROM for software changes; powered by NT-1 or PBX, or via own power supply	If configured for data, an RS-232 interface for packet- or circuit-switched data	ISDN BRI S/T interface; also supports multipoint passive bus connection (currently limited to 2 B-channel users, up to 8 via B and D channels)	If optionally configured for data, supports D-channel packet data, or D-channel packet as well as B-channel circuit-switched data; B-channel support of asynchronous, full-duplex, circuit-switched data to 19.2K bit/sec, D-channel packet data to 9.6K bit/sec; PAD included with either data module; telephony features include call forward and park, calling number ID, call back queuing, speed calling, last number redial and message waiting	Northern Telecom T-link protocol for B-channel circuit-switched data, if configured for this option	Northern Telecom DMS Series switches (BCS 29 and later software) and Meridian 1 (SL-100 class) PBXs; either stimulus or functional signaling supported (functional or basic call control and selected supplementary services)	$435 voice-only set; $510 to $580 for voice/data set (preconfigured for data); $130 data option for packet-mode (D-channel) data; $145 data option for circuit-switched (B-channel) data
Teleos Communications, Inc. Eatontown, N.J. (201) 387-5700	B101 PC/ST ISDN Terminal Adapter	ISDN adapter card for IBM PC XT or AT running DOS Version 2.1 or later with hard disk, 640K-byte RAM; includes a NETBIOS-like API; supports analog phone device; separate power supply available for phone use when personal computer is turned off	RJ-11 for analog phone device, provides PC COM port interface for existing applications and shared-memory interface for integrated voice/data application development	ISDN BRI S/T interface (RJ-45) to an NT-1 or NT-2 (PBX-like) device; integral U interface planned for first quarter of 1991	Simultaneous voice and data via B channels; D-channel use for packet-switched data supported via X.25 processing (included); AT modem command set interpreter supports existing asynchronous communications software via COM port	V.120 for B-channel circuit-switched data, X.25 for D-channel packet-switched data	AT&T 5ESS (5E4.2 and 5E6 software); Northern Telecom DMS-100 (BCS 25 software); Siemens EWSD (Release 4.0 software); also compatible with Teleos Access Server and Resource Exchange (1)	$1,395
Telrad, Inc. Woodbury, N.Y. (516) 921-8300	IDS 28X-Series ISDN Voice/Data Terminal	Family of voice-only or voice/data ISDN phone sets; include 8-, 16- and 32-button models, all with LCD display and speakerphone; field-upgradable options, software changes; powered remotely by NT-1 or switch	Up to 2 RS-232 ports (DB-25 connectors)	ISDN BRI S/T interface	Models configured for data support D-channel packet data to 9.6K bit/sec (PAD included), or B-channel circuit-switched data to 38.4K bit/sec asynchronous (to 56/64K bit/sec synchronous), or both circuit- and packet-switched data; programmable PAD parameters retained in nonvolatile memory; telephony features include call hold, conference, transfer, drop/release, speed dialing, multiple call appearances and directory numbers, and key system features	Telrad proprietary rate adaption in older models; newer models add support for DMI and Northern Telecom T-link protocols; V.120 support is planned	AT&T 5ESS and Northern Telecom DMS-100 central office switches	From $500 (voice only) to $1,100 (full data capabilities)
	MPA 19	Rack-mounted terminal adapter modules (designed for vendor's rack-mountable frame); supports asynchronous data devices, either 2 B-channel links or 2 B-channel and a D-channel link per module; powered from frame; no telephony capability	2 or 3 RS-232 ports per module to 16 modules per rack, yielding up to 32 B-channel and 16 D-channel data links	ISDN BRI S/T interface	DTA model supports 2 circuit-switched B-channel data connections (asynchronous to 38.4K bit/sec); PTA model adds support for packet-switched data (to 9.6K bit/sec)	Currently Telrad proprietary rate adaption only; DMI, Northern Telecom T-link and V.120 planned	AT&T 5ESS and Northern Telecom DMS-100 (software version unspecified)	From $550 to $1,100 per channel
Universal Data Systems, Inc. Huntsville, Ala. (205) 430-8000	UDS TA100	Desktop or rack-mountable terminal adapter; supports 1 data device and 1 analog telephone device; separate power for desktop configuration; powered by frame for rack-mounting	RJ-11 for analog phone device; data port is either RS-232, EIA RS-530, or V.35; AT modem command set-compatible	ISDN BRI S/T interface	Depending on data interface, circuit-switched B-channel data supported to 19.2K bit/sec asynchronous to 56/64K bit/sec synchronous; DTMF or pulse-dial analog phone sets supported; telephony features vary with central office switch and software version, including call waiting, 3-way conference calling and up to 5 line appearances (extension) per voice channel	Northern Telecom T-Link	AT&T 5ESS, Northern Telecom DMS-100 (software versions unspecified)	$1,500

AC = alternating current
API = application program interface
BRI = Basic Rate Interface
CSU = channel service unit
DCE = data communications equipment
DDS = digital data services
DMI = AT&T's Digitally Multiplexed Interface
DTE = data terminal equipment
DTMF = dual-tone multifrequency
EIA = Electronic Industries Association
EISA = Extended Industry Standard Architecture
HDLC = High-Level Data Link Control
ISA = Industry Standard Architecture
LAP B = Link Access Procedure B
LAP D = Link Access Procedure D
MCA = Micro Channel Architecture
NA = not applicable
NETBIOS = Network Basic I/O System
NT-1 = network termination 1
NT-2 = network termination 2
PRI = Primary Rate Interface
SDN = AT&T's Software-Defined Network

FOOTNOTE:

(1) See the chart for ISDN concentrators, gateways and multiplexers on page 55.

This chart includes a representative selection of vendors of ISDN terminal adapters, phone sets and adapter boards. Some vendors not included may offer a full range of competitive products.

SOURCE: MIER COMMUNICATIONS, INC., PRINCETON JUNCTION, N.J.

ISDN-capable PBXs and voice/data switches

Company	Product	Description	Station device attachment	ISDN network interfaces	Major ISDN telephony features	ISDN switch/service compatibility	Rate adaption	Price
AT&T Business Communications Systems Bridgewater, N.J. (201) 658-6000	Definity Generic 1 and Generic 2 Communications Systems	Digital switches supporting from 40 to 30,000 stations or lines	AT&T digital phone sets use either AT&T's DCP or ISDN BRI (Models 7505, 7506 and 7507); 8 DCP or BRI ports per line card; DCP or BRI equipment supported as far as 2,000 feet, depending on wire gauge (24 AWG or 26 AWG) and application; station wiring is two pairs, plus one pair for power; all AT&T sets (analog, DCP and BRI) function with ISDN PRI; standard 2500 analog sets also supported	Generic 1 switch supports as many as 8 PRI connections; Generic 2 supports as many as 511 PRI connections; a CSU must terminate each T-1/PRI link at a maximum of 655 feet using 24 AWG wire	With 750X sets, as many as 10 (Models 7505 and 7506) or 31 (Model 7507) line appearances; simultaneous voice/data transmission at up to 19.2K bit/sec (via optional integrated asynchronous data module); D-channel backup and non-facility associated signaling (Generic 2 only); call-by-call service selection; receipt and display of calling party name or billing name on any terminal with display capability	AT&T 5ESS and 4ESS; testing under way with Northern Telecom DMS-100 and DMS-250; AT&T Megacom, Megacom 800, SDN, Call-by-Call, SDDN up to 64K bit/sec	AT&T's digital multiplexed interface Modes 1 & 2 (asynchronous and high-speed synchronous data, respectively)	400-line switch configuration (1): $132,131; digital phone sets: (includes integrated asynchronous data module): $650 for Model 7505 (29 feature buttons); $770 for Model 7506 (adds a 48-character display); $1,080 for Model 7507 (52 feature buttons, 80-character display) (2)
Hitachi America, Ltd. Telecommunications Division Norcross, Ga. (404) 446-8820	HCX 5000 Series	ISDN-compatible PBX family, each with integrated ACD, call accounting, message center, voice mail and feature-transparency networking; low-end HCX 5300 supports as many as 416 lines or 544 ports; high-end HCX 5600 supports as many as 6,144 lines or 10,240 ports	SelecSet family of phone sets come data-ready (RS-232, for asynchronous data to 19.2K bit/sec); high-speed data options available; sets use time-division multiplexing of a 3B+D proprietary format signal (D channel for call control and signaling only); feature sets connect via RJ-11 jacks over a single wire pair to 2,000 feet, or over two pair to 4,000 feet; standard 2500 analog sets also supported (to 4,000 feet)	All HCX 5000 PBXs, and all current software releases, support ISDN PRI to AT&T and/or US Sprint Communications Co. PRI services; all common non-ISDN analog and digital trunks supported	ACD, call accounting, voice mail, text message, directory and feature-transparency networking are all standard; optional data modules, which attach externally to feature sets, support RS-449 interface, synchronous data to 64K bit/sec	AT&T 4ESS, Northern Telecom DMS Series; specifically compatible with AT&T and US Sprint PRI services	V.110 for synchronous data; a proprietary version of V.110 for asynchronous data	400-line switch (1): $112,000 to $135,000; digital phone sets: $115 to $175 for low-end SelecSets; $332 to $339 high-end sets; all are data ready (RS-232)
InteCom, Inc. A subsidiary of Matra S.A. Allen, Texas (214) 727-9141	IBX S/10, S/80, S/80+	Digital switch for integrated data and voice communications; low-end S/10 supports as many as 3,000 lines, high-end S/80+ as many as 22,000 (all are non-blocking)	Variety of data-device attachment modules are offered; support for: RS-232 asynchronous data to 19.2K bit/sec, V.35 or RS-449 synchronous data to 57.6K bit/sec; 3270 coaxial cable; DB-15/attachment unit interface for Ethernet (switches about 1M bit/sec); vendor's digital phone sets support data-device attachment via optional modules; vendor specifies two-pair, 24 AWG wiring; all digital station equipment supported to 2,000 feet, and can usually be extended to 4,000 feet	ISDN PRI supported with Version 9 of vendor's software; Version 10 adds support for BRI connections from PBX to AT&T 5ESS central office switch	All InteCom digital phone sets and data interface units for asynchronous or synchronous data transmission can access and work with PRI service and features	AT&T 5ESS and 4ESS; specifically compatible with AT&T Megacom, Megacom 800, SDN and Accunet Switched 56 services	V.110	400-line switch (1): $100,000 to $120,000; digital phone sets: $350 list price (all vendor's digital phone sets that include display for ANI)
NEC America, Inc. Melville, N.Y. (516) 753-7000	NEAX 2400 IMS	Modular digital voice/data switching system that supports from 160 to 23,552 ports; 5200 feature package supports ISDN PRI with public-network switches and services, or private-network connectivity (Signaling System 7 based)	Vendor's digital phone sets support optional, add-on data modules; voice and data are time-division multiplexed (256K bit/sec-composite) over 2 B+D BRI-like interface; vendor's proprietary protocol supports station equipment to 4,000 feet via 2-pair, 24 AWG wiring (also carries power to station sets); standard analog phone sets also supported	ISDN PRI	NEC's digital phone sets with optional data modules support asynchronous data up to 19.2K bit/sec, synchronous up to 64K bit/sec; PRI features include alternate and time-of-day PRI routing; call forwarding, transfer, hold and pickup; incoming call identification; others as supported by ISDN carrier (for example, AT&T call-by-call service selection)	AT&T 4ESS, 5ESS; Northern Telecom DMS-100, DMS-250; specifically compatible with PRI services of AT&T and US Sprint	V.110	400-line switch (1): $120,000 to $140,000, digital phone sets: price range for vendor's digital phone sets not specified
Northern Telecom, Inc. Richardson, Texas (214) 437-8000	Meridian 1 (includes enhanced versions of former SL-100 and SL-1)	Family of digital PBXs serving from 30 to 10,000 lines; PRI support consists of loading ISDN signaling package (Feature Option 145) and installing a PRI circuit pack and D-channel handler; BRI-station support available on SL-100 class systems	Support for ISDN BRI station equipment (S/T and U interfaces) currently limited to the SL-100 high-end switch; most station equipment attaches via proprietary interfaces (see Table 1 for Northern BRI phone sets/adapters, designed for use with DMS-100 central office switch and SL-100); PRI features vary depending on whether ISDN link is to other Northern Telecom SL series PBX (private network), DMS central office switch or AT&T switch; proprietary station wiring, distances not specified	ISDN PRI, including to AT&T 4ESS and 5ESS, supported with Generic Meridian XII Release 16 software for SL family of PBXs (released in June)	ANI/station identification, supported in call detail recording record; T-1 extended superframe format and clear-channel 64K bit/sec support via bipolar eight zero code substitution; network message center and ACD; data packet network access; call-by-call service selection (AT&T, MCI Communications Corp. and US Sprint)	With Release 16, AT&T 4ESS and 5ESS, Northern Telecom DMS-100 and DMS-250; specifically compatible with PRI services of MCI, US Sprint and AT&T (Megacom and Megacom 800)	Not specified	400-line switch (1): $85,000 to $120,000 for a fully redundant system (varies depending on distributor); digital phone sets: price range not specified
Rolm Co. Norwalk, Conn. (203) 849-6000	9751 CBX with 9757 Adapter	Digital PBX; ISDN PRI supported via an external adapter, which physically supports as many as 12 ISDN PRI links	Rolmphone digital sets attach to PBX via a proprietary multiplexed digital interface; ISDN BRI station support is planned; current wiring and distance specifications not specified	ISDN PRI, requires Release 9005.1 software on PBX, which provides interface to external 9757 adapter	Supports ANI; others unspecified	AT&T 4ESS, Northern Telecom DMS-250; specifically compatible with AT&T, MCI and US Sprint (4ESS-based) PRI services	Unspecified	Vendor could not provide pricing on add-on 9757 ISDN-PRI adapter, or range of pricing on specific configuration or digital station equipment
Teleos Communications, Inc. Eatontown, N.J. (201) 387-5700	IRX 9000 Intelligent Resource Exchange	Low-end integrated voice, data and image-handling ISDN switch, designed for telemarketing center applications; available in a 6- or 20-slot unit; routing control is relegated to a token-ring-attached IBM Application System/400	Line modules support either one ISDN PRI or four ISDN BRI interfaces (S/T interfaces); others support T-1, 4M bit/sec token ring; standard BRI S/T interface support (4-wire/2-pair up to 3,300 feet, using an RJ-45 connector) and PRI; BRI phone sets supported include AT&T 750X series and Northern Telecom 53XX/52XX sets	ISDN PRI and BRI	Call hold, transfer and drop; others as supported by IBM CallPath/400 software (running on AS/400 controller)	AT&T 4ESS, 5ESS; Northern Telecom DMS-100, DMS 250; specifically compatible with AT&T and US Sprint ISDN PRI services	Proprietary technique for data bridged over token-ring LANs (source routing compatible)	Central system hardware, including line modules, costs about $2,500 per port; ISDN phone sets: $400 to $800 per ISDN BRI phone set

ACD = Automatic call distributor
ANI = Automatic number identification
AWG = American wire gauge
BRI = Basic Rate Interface
DCP = Digital Communications Protocol
PRI = Primary Rate Interface
SDN = AT&T's Software-Defined Network
SDDN = AT&T's Software-Defined Data Network

FOOTNOTES:
(1) Configuration pricing, or price range, based on a 400-subscriber-line switch with four PRI trunks. Price excludes the cost of station equipment and wiring and installation charges, but assumes 200 lines for 2,500 sets and 200 lines for feature sets, each with voice/data capability.
(2) See the chart for ISDN terminal adapters, phone sets and adapter boards beginning on page 45.

This chart includes a representative selection of vendors in the ISDN-capable PBXs and voice/data switches market. Vendors not included may offer a full range of competitive products.

SOURCE: MIER COMMUNICATIONS, INC. PRINCETON JUNCTION, N.J.

(continued from page 43)

V.120 is in the process of being adopted as an ANSI standard. Indeed, about half of the adapter vendors listed in the chart now support it. But AT&T, which stubbornly uses only its own proprietary Digital Multiplexed Interface technique, does not yet support V.120.

V.120 has significant new error protection and speed matching functions that its predecessor, V.110, lacked.

V.110 still dominant

However, V.110 is reportedly the predominant technique used in Europe and Japan. Therefore, some vendors, including Fujitsu, retain V.110 operational compatibility and have added V.120 support.

In the case of Fujitsu, the user can select between techniques via a keyboard command from an attached data device.

With a few exceptions, most vendors of personal computer plug-in ISDN adapter cards provide what is called "COM port" support for personal computer applications and communications software.

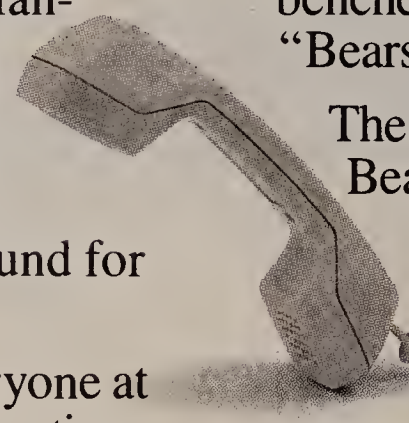
The COM port is the designation for the serial port, usually RS-232, that personal computer applications and system software access for remote communications. Depending on the personal computer configuration, there may be more than one COM port. For example, IBM Personal Computer ATs have two, and most

(continued on page 51)

NEC's PBX System takes on the Chicago Bears.

There's a new line-backer at Soldier Field this season—the NEAX®2400 Information Management System. This PBX system from NEC has proven its durability on the field by giving the Chicago Bears a better way to call the signals. And its tough-as-nails engineering means it will be around for many years to come.

The NEAX2400 gives everyone at Soldier Field a piece of the action. For instance, it coordinates the communications for on-site ticket offices, the Club House, Sky Box and President's box. The TV trucks and camera crews use the system for press-related activities, including instant replays. And there's even a Hot Line between the benches and the locker rooms for the ultimate in "Bears' Control".



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NEC

See The FAXNeT Form on Page 33

(continued from page 49)
Personal System/2s have three.

These ISDN adapter cards, with their associated driver software, intercept and redirect COM port calls to the ISDN adapter. This means that most personal computer communications software can work unmodified with the ISDN adapter.

One advantage to plug-in ISDN adapter boards is that a separate power supply is usually unnecessary.

Most stand-alone terminal adapters come with their own AC power adapter.

Depending on the vendor, ISDN phone sets may either use their own power adapter or "phantom" power, which is transmitted on the same lines along with data from a PBX or other external source. Increasingly, ISDN phone sets are drawing electrical power from the NT-1 to which they attach via a separate wire pair used exclusively for this purpose.

Users studying their environmental requirements for ISDN must keep the power issue in mind. Using power supplied by the NT-1 is perhaps the least complicated alternative, but doing so requires that an extra wire pair — a minimum of three pairs — be run within the user's premises from each NT-1 to the ISDN station set. And both the NT-1 and phone set or adapter need to support power delivery over this separate wire pair.

Most users won't pay five or six times the price for a feature phone set simply because it is connected to an ISDN service.

▲▲▲

Prices, functions reduced

As mentioned, the ISDN adapters that emerged a few years ago, which had every conceivable feature, interface and capability built in, have been redesigned and reworked. Numerous adapters in the accompanying chart provide data-only device attachment and conspicuously lack any voice or telephony feature support.

The result for users is reduced prices but, in some cases, sharply reduced capabilities as well. Some of these adapters now cost from $700 to $850, half the $1,500-plus price tag that the early generation of full-function ISDN adapters carried.

Among the lowest priced ISDN station sets available today is a new line from Northern Telecom. The M5209T ISDN Digital Phone lists for only $435 for a voice-only configuration. The same unit configured with support for B channel circuit-switched data costs $580.

Clearly, Northern Telecom has determined that most users considering ISDN won't pay five or six times the price for a feature phone set simply because it is connected to an ISDN service.

Even $435 — still roughly double the existing non-ISDN feature-set price — may be too much for some users to swallow, but it is certainly more digestible.

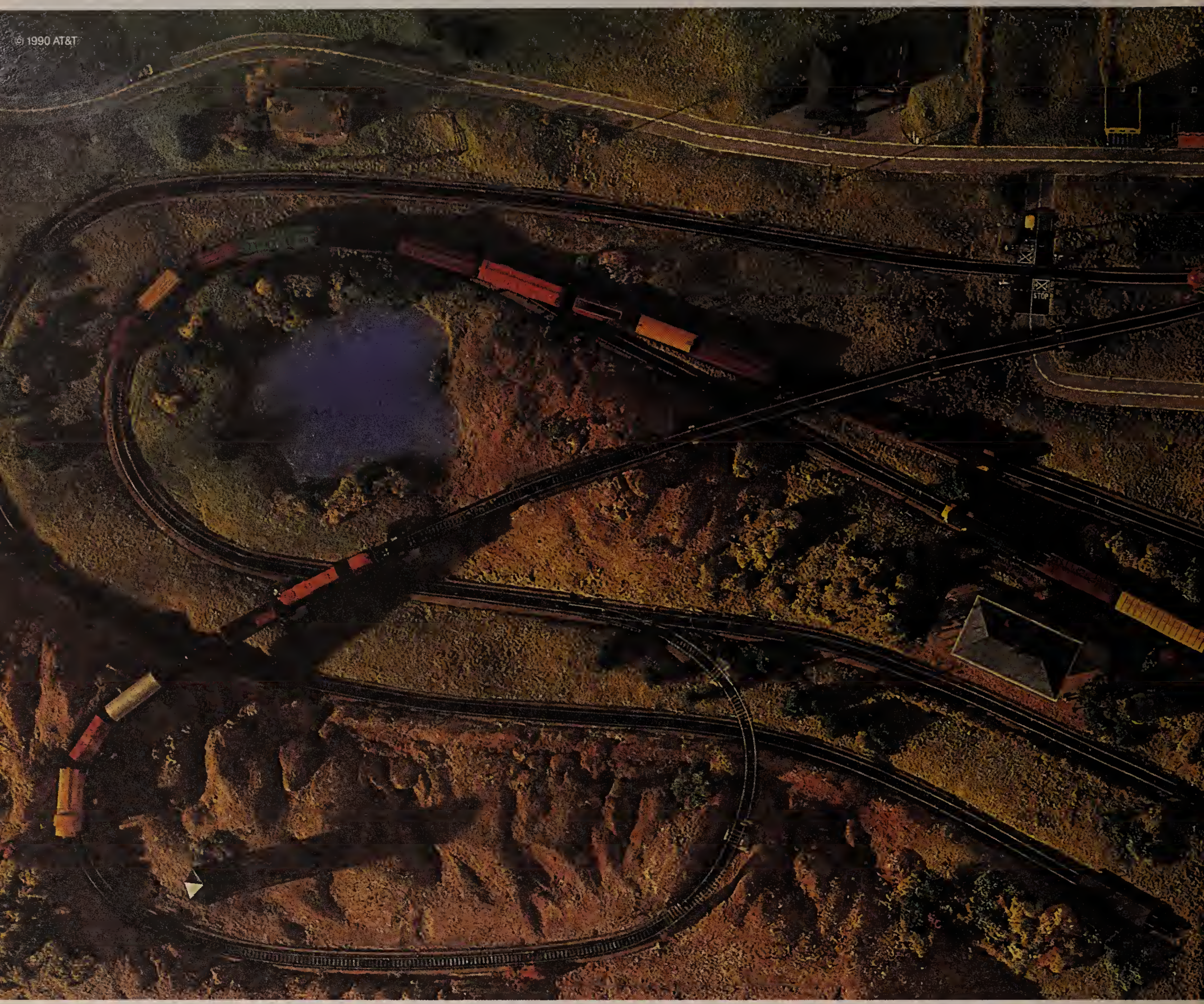
Assuming an ISDN market eventually materializes in the U.S. and economies of mass production can be applied, it will probably be several years before ISDN phone prices undergo another round of reductions and come anywhere close to parity with their pre-ISDN predecessors.

ISDN CPE behind PBXs

The chart on page 49 provides a comparison of ISDN-capable PBX offerings from major U.S. suppliers of digital voice/data switching systems. Except for AT&T's Generic 2 Definity and Northern Telecom's Meridian 1 — the high-end PBX models from these vendors — PBXs generally support only network-side connection to ISDN via PRI (23 B+D).

AT&T says its Generic 2 Definity can be configured with special line cards to provide bona fide

(continued on page 55)



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NETWORK WORLD

ISDN concentrators, gateways and multiplexers

Company	Product	Description	Device attachment	ISDN network access	ISDN switch/service compatibility	Price
Ascend Communications, Inc. San Francisco (415) 397-9015	Pipeline 4 and Pipeline 17	Expandable concentrator systems that pack asynchronous RS-232 host computer ports and/or sessions into multiple ISDN B channels; low-end Pipeline 4 provides 4 interface-card slots, supports as many as 64 packet-switched and 32 circuit-switched ports via as many as 16 BRI connections; Pipeline 17 supports as many as 480 packet-switched ports and 256 circuit-switched ports	Host interface cards connect via 50-pin telco connectors and cable to host computer; packet-switched host card accepts and multiplexes as many as 32 asynchronous RS-232 host sessions, each to 19.2K bit/sec (200 packets per second throughput); circuit-switched host card accepts as many as 32 RS-232 circuit-switched sessions and rate adapts each to 56/64K bit/sec ISDN channels	Via multiple BRI connections; RJ-45 connector on network interface cards	AT&T 5ESS (5E5, 5E6 software); Northern Telecom, Inc. DMS-100 (BCS-28, BCS-30 software)	$16,000 for Pipeline 4 Starter System; $22,250 for Pipeline 17 Starter System (includes chassis, power, controller card, multiport BRI card and one packet-switched host-interface card)
DigiBoard, Inc. Saint Louis Park, Minn. (612) 922-8055	ISDN tel/ adapter with NetLink option	ISDN terminal adapter card; plugs into IBM PC XT or AT; provides ISDN gateway services for as many as 20 workstations on a NETBIOS LAN	Card plugs into IBM PC XT or AT slot; supports as many as 4 DOS COM ports via Interrupt 14; includes X.25 software using AT modem command set, supports NETBIOS interface to LAN; supports X.25 transmission at rates to 120K bit/sec	ISDN BRI interface, uses proprietary data protocol over circuit-switched (B channel) connection	AT&T 5ESS (5E5, 5E6 software); compatible with BRI services of AT&T, Bell Atlantic Corp., BellSouth Corp., Nynex Corp., Pacific Bell, Pacific Telesis Group and US West, Inc.	$1,495 for basic tel/adapter (1); $595 for NetLink LAN-gateway option
Gandalf Data, Inc. Wheeling, Ill. (708) 459-9348	Starmaster with Primary Rate Module 2100	Multiprotocol ISDN gateway/concentrator for data-only applications; carries synchronous or asynchronous data streams transparently within ISDN B channels; includes statistical multiplexing up to 64K bit/sec for multiple subrate data streams; can use calling-line ID for data access, security, automatic service selection	System supports 8 asynchronous ports, each up to 19.2K bit/sec; 8 synchronous ports at up to 64K bit/sec each; LAN interface supports TCP/IP or Local Area Transport protocols at 10M bit/sec; X.25 supported at 64K bit/sec, Systems Network Architecture at up to 19.2K bit/sec	ISDN PRI (DB-15 connector), either North American 23 B+D or European 30 B+D	Northern Telecom DMS-100; British Telecommunications PLC (provisionally tested); compatible with the PRI services of MCI Communications Corp., Telecom Canada and US Sprint Communications Co.	$8,000 hardware and software (basic Starmaster system with PRM 2100)
General DataComm, Inc. Middlebury, Conn. (203) 574-1118	Megamux TMS	High-capacity networking multiplexer supporting as many as 28 PRIs	Two PRI ports per card; PRI formats/services supported include: 23 B+D, 30 B+D, H0 (switched 384K bit/sec), H11 (switched 1.536M bit/sec), H12 (switched 1.920M bit/sec)	ISDN PRI	AT&T 4ESS PRI; compatible with Telecom Australia's primary rate access, AT&T's Software-Defined Data Network PRI, Nippon Telegraph and Telephone Corp.'s INSNET 1500 (including H0, H11 formatted channels)	$15,900 for two-PRI port access card (basic Megamux system is prerequisite)
Teleos Communications, Inc. Eatontown, N.J. (201) 387-5700	IAP6000 ISDN Access Server	Customer premises controller that allows multiple ISDN BRI, PRI and T-1 interfaces to be concentrated into one or more PRIs or T-1s; can operate stand-alone or interface with other customer networks and traffic types, including LANs, videoconferencing, Group IV fax, switched digital services (56K, 64K, 384K or 1,472K bit/sec), virtual private networks and PBXs; available in both 6- and 20-slot configurations	Interface units are available that support 4 ISDN BRI S/T interfaces; token-ring interface should be available first quarter 1991; ISDN PRI; T-1 (one digital signal cross-connect or DS1 interface per unit)	ISDN PRI and BRI	Northern Telecom DMS-100 and DMS-250 PRI, SL-1 and SL-100 PRI (user side); AT&T 4ESS PRI, 5ESS (5D5 software) PRI and BRI; System 85 PRI (network side); Nippon Telegraph and Telephone BRI; ISDN PRI services of AT&T and US Sprint	Starts at $15,500
Timeplex, Inc. Woodcliff Lake, N.J. (201) 391-1111	ISDN Gateway Server, Models 16 and 44	Gateway servers for attaching non-ISDN PBXs, computers, terminals and video devices to ISDN PRI services; support 16 and 44 physical ports, respectively; both allow as many as 96 channels to contend for the 23 B channels; convert the non-ISDN signaling required for call setup and tear-down to ISDN D-channel messages	Connects via DS1 to digital PBXs and via 4-wire E&M signaling to analog PBXs; V.35 and RS-422 interfaces for data and video device attachment, others for subrate data devices	ISDN PRI	AT&T 4ESS, Northern Telecom DMS-250; compatible with PRI services of AT&T and US Sprint	Ranges from $12,500 to $19,200 for Model 16; $15,000 to $24,000 for Model 44

BRI = Basic Rate Interface
PRI = Primary Rate Interface

FOOTNOTES:
(1) See the chart for ISDN terminal adapters, phone sets and adapter boards beginning on page 45.

This chart includes a representative selection of vendors in the ISDN concentrator, gateway and multiplexer market. Vendors not included may offer a full range of competitive products.

SOURCE: MIER COMMUNICATIONS, INC. PRINCETON JUNCTION, N.J.

(continued from page 51)

ISDN BRI support to BRI equipment. However, AT&T does not consider its so-called BRI phone sets, the Models 7505, 7506 and 7507, to be portable to other vendors' ISDN PBXs or switches, most notably Northern Telecom's.

What's more, no third-party vendor of BRI customer premises equipment has claimed compatibility with the BRI interface of AT&T's PBX.

This presupposes that either compatibility testing is not offered yet, AT&T's BRI is still being refined or its Definity 2 BRI is not strictly in conformance with ISDN BRI standards.

Similarly, Northern Telecom is vesting its high-end PBX, the Meridian 1, with the ability to host ISDN BRI-compatible phone sets behind the PBX as station equipment.

This claim is more believable because the Meridian 1 is essentially the same hardware base as the DMS-100, Northern Telecom's Class 5 ISDN-compatible central office switch.

BRI support for PBXs is a significant new development that could eventually lead to BRI becoming universal for PBX station equipment.

Currently, several different proprietary digital multiplexed techniques are used to link station equipment from the desktop to many vendors' PBX line cards. When this evolves and when PBX and central office switch manufacturers consistently implement standard ISDN telephony features, users should finally be able to unplug a BRI station device from one PBX or central office-based ISDN switch and plug it into any other.

BRI support has been slow in coming to PBXs because widespread deployment would likely have preempted the local telephone companies' offerings of Centrex-based ISDN BRI service.

And AT&T and Northern Telecom, the primary suppliers of central office switches to the local telephone companies, were unwilling to jeopardize this potentially immense new market by making ISDN BRI widely available on their PBXs, which constitute the local telephone company's primary competition to Centrex.

Other new ISDN developments on the PBX front are Northern Telecom's newly announced support for PRI interworking with AT&T's 4ESS and 5ESS. Northern Telecom offers this support for both the SL-1 and SL-100 models of its new Meridian 1 PBX line.

Similarly, AT&T claims that testing is under way for PRI access from both of its Definity models, as well as from Northern Telecom's DMS-100 and DMS-250 switches.

As with Northern Telecom's switches, an exact mapping of the different features of both vendors' switches would be required to determine which ISDN features and capabilities are now common to both and which are different. But the mutual support and announced intentions of these two industry giants are certainly a step in the right direction for users.

Concentrators, gateways

The final category of ISDN customer premises equipment covered in this Buyer's Guide is that of data-oriented devices such as ISDN concentrators, gateways and multiplexers (see chart, this page).

The diversity of these products precludes a comprehensive overall assessment. But most of the products, such as those from Ascend Communications, Inc. and Gandalf Data, Inc., either interconnect multiple non-ISDN data channels to one or more ISDN access facilities or permit customer premises cross-connection of multiple ISDN channels, such as, products from General DataComm Industries, Inc. and Timeplex, Inc., for example.

These products, along with the ISDN adapters and ISDN-compatible PBXs, represent a formidable array of capabilities that are waiting for ISDN to blossom in the U.S.

In what appears to be a classic chicken-and-egg dilemma, the next phase of ISDN customer premises equipment innovation and price/performance improvement will probably not occur without a growing ISDN user base to prompt and support it.

And some nay sayers believe that a user base may not materialize until ISDN equipment and services become less expensive and more feature-rich.

Letters

continued from page 35

Resellers, not aggregators

Your article regarding the formation of the Interexchange Resellers Association (IRA) ("Industry Briefs," *NW,* Oct. 15) may have caused some confusion in the minds of your readers regarding the term "aggregator." IRA was formed to represent the interests of companies that *resell* AT&T's Software-Defined Network (SDN) service.

Reselling is distinguished from aggregating principally in the relationship between the end user and the supplier.

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Under SDN reselling, the relationship between customer and supplier changes. End users purchasing services from an SDN reseller are customers of that reseller.

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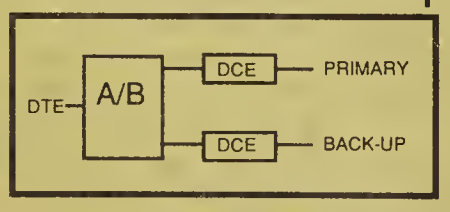

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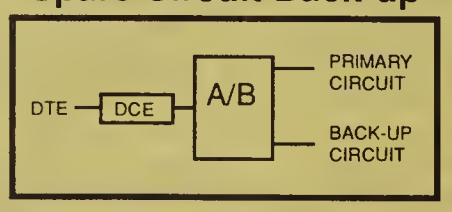

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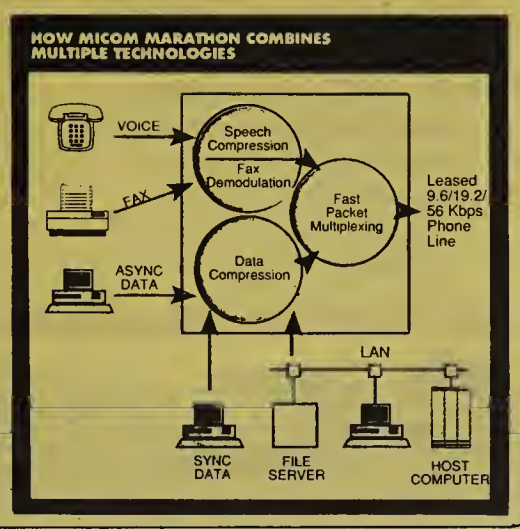

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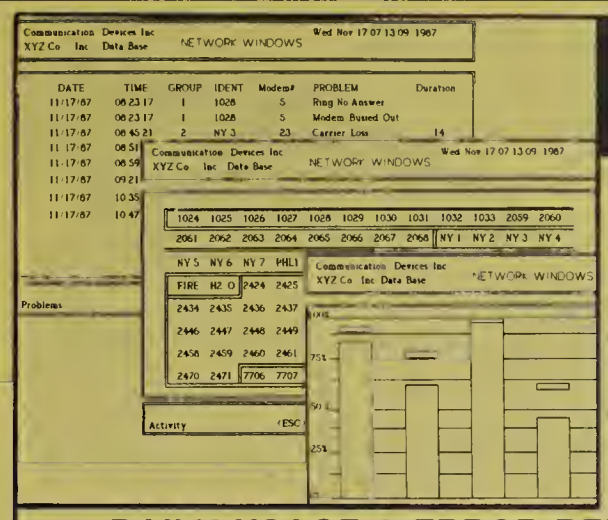

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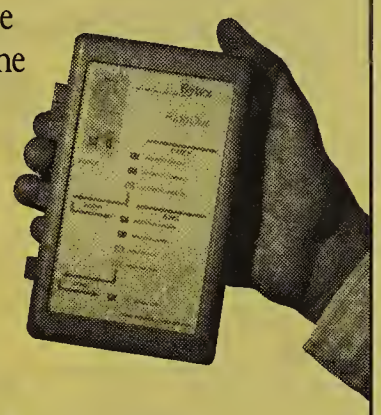

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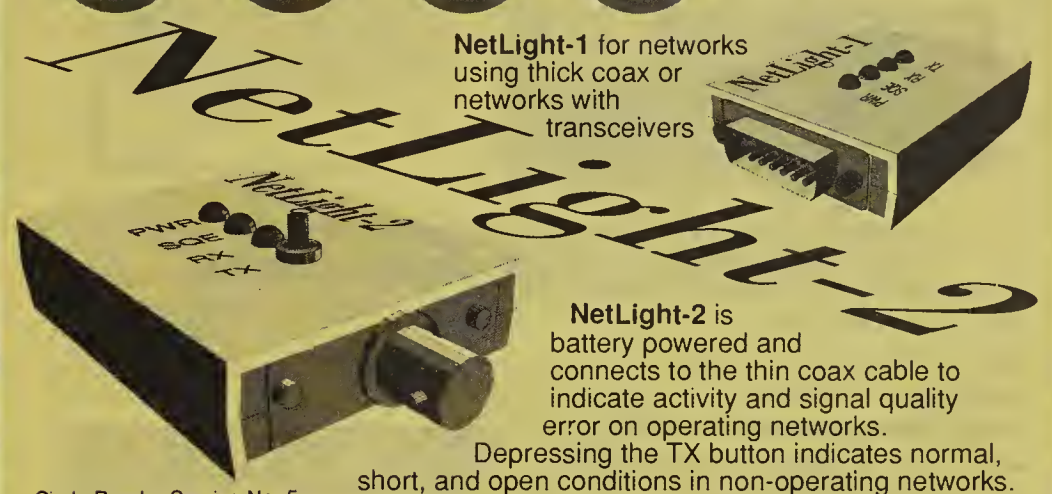

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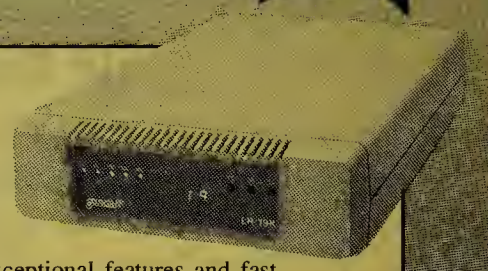

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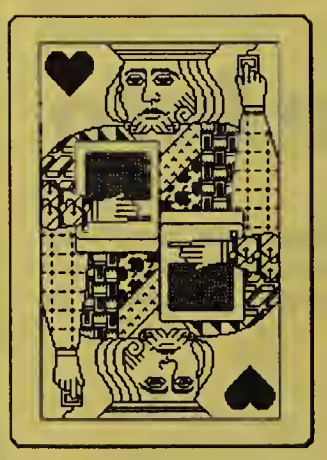

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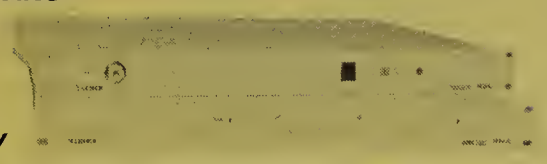

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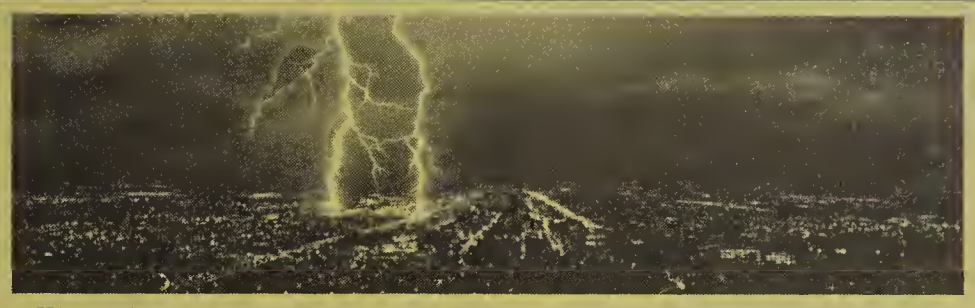

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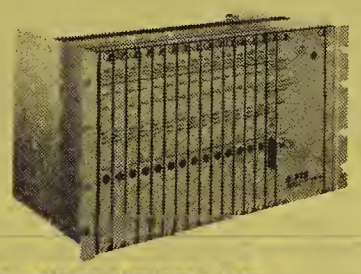

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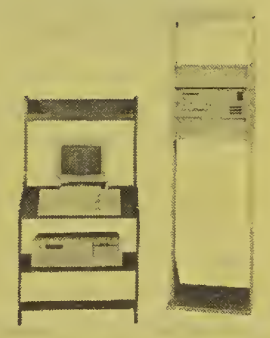

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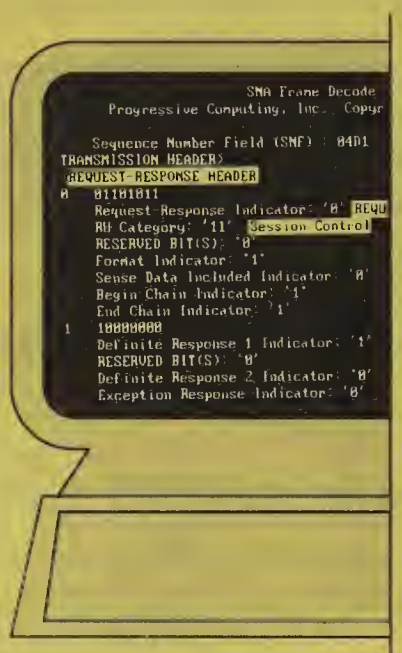

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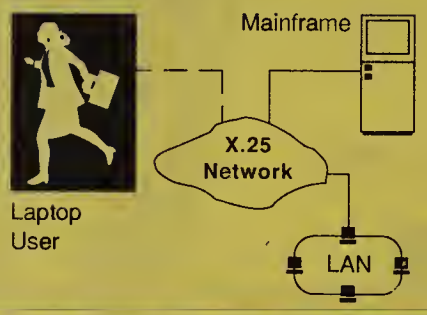

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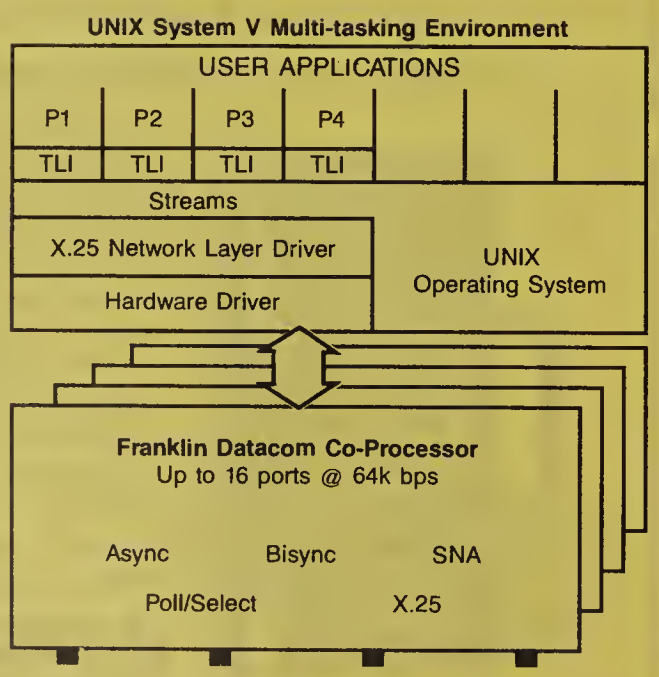

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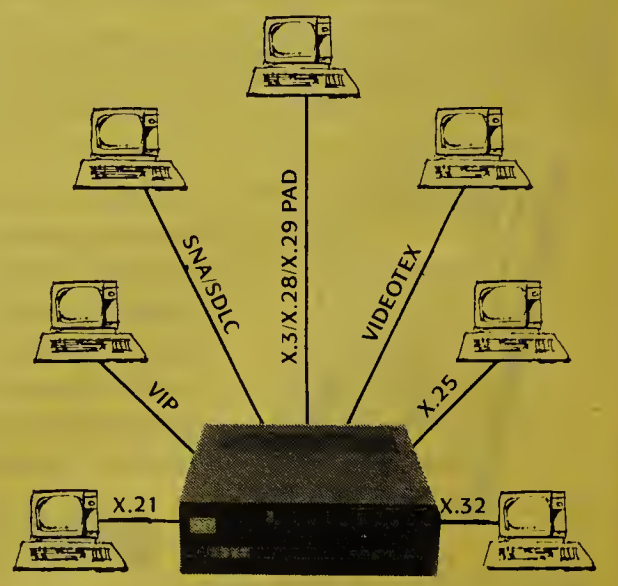

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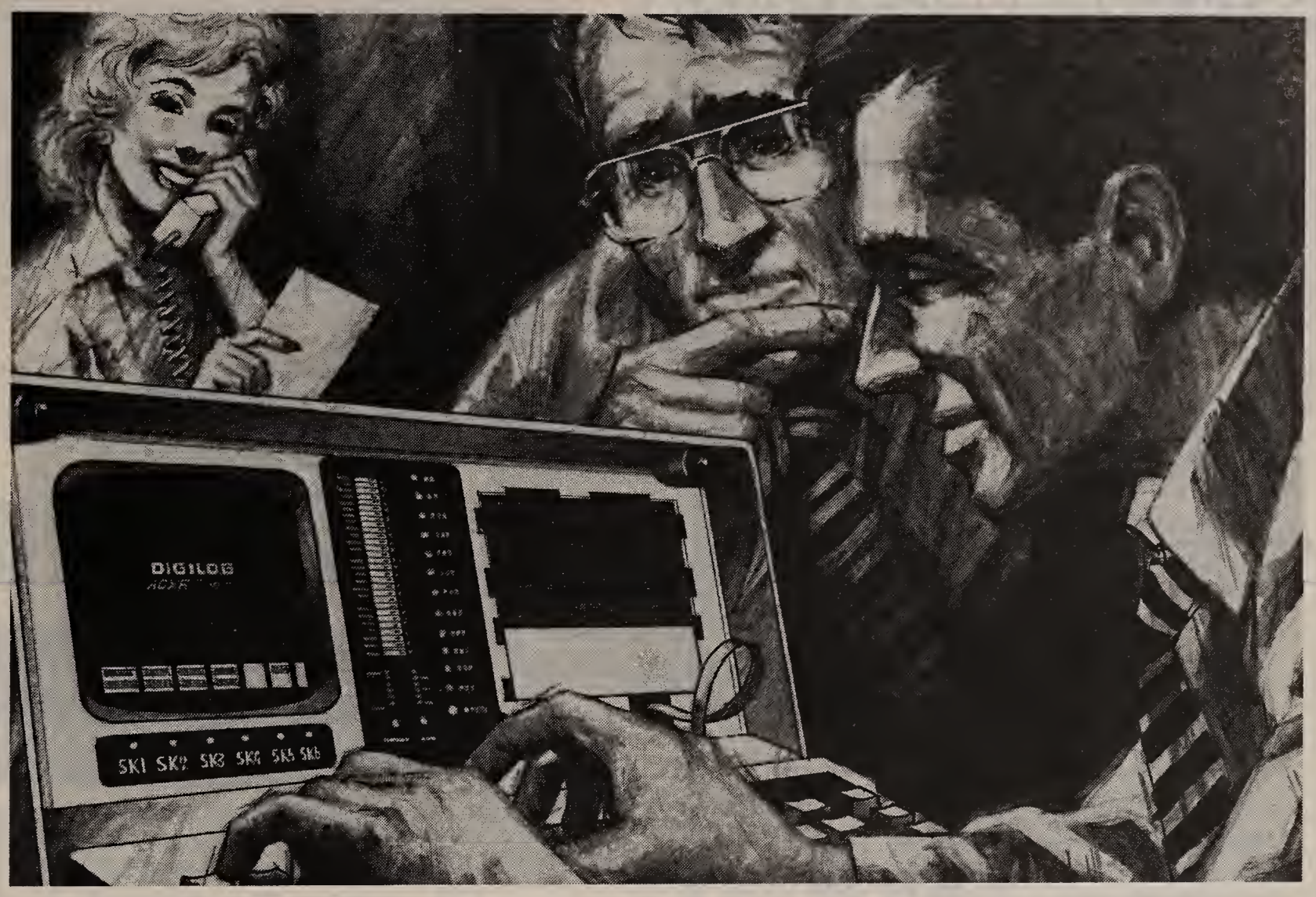

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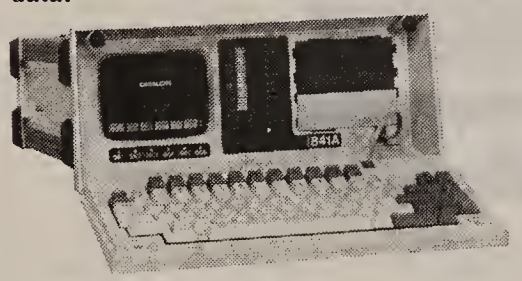

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WE UNDERSTAND NETWORKING INSIDE AND OUT.™

IBM and Microsoft update progress on common APIs

Firms meet at Comdex to assess developments.

By Tom Smith
Senior Writer

LAS VEGAS — One year after they promised to merge their OS/2-based local-area network operating systems, IBM and Microsoft Corp. assessed their progress at Comdex/Fall here last week and outlined work that still needs to be finished.

At last year's Comdex/Fall, the two companies announced that they would adopt a consistent strategy to allow software developers to write applications that could run under IBM's LAN Server and Microsoft's LAN Manager ("IBM, Microsoft plot cohesive LAN plan," *NW,* Nov. 20). LAN Server is based on LAN Manager but had been altered over time by enhancements.

"We've made tremendous progress [in unifying the products]," said John Soyring, director of the Austin, Texas, programming center in IBM's Entry Systems Division.

Soyring said the vast majority of application program interfaces (API) in the two net operating systems are now identical. The notable exception is the Network Basic I/O System API. "[The APIs] will converge in the not too distant future," Soyring said. "Application developers need them to be consistent."

The companies have also incorporated the same security and network access protocol in their operating systems, according to Eric Rudder, senior program manager in Microsoft's Network Business Unit.

One difference yet to be resolved is support for aliases in domains. Network domains are groups of LAN servers that can be administered as one logical server with a common data base. This means users can be added to a domain by simply updating one server within the domain, Soyring explained.

IBM currently supports aliases, which allow users to assign a simple name, such as accounts receivable, when moving a file within a domain. "A main benefit [of aliases] is ease of administration," Soyring said. Microsoft does not include support for aliases in LAN Manager.

The two companies also do not have identical user interfaces. Although both companies support OS/2 Presentation Manager for some applications, neither vendor uses it as the user interface to administrative applications such as tracking net resources and security. For these applications, IBM uses a full-screen character interface, Soyring said, while LAN Manager uses a command-line interface.

IBM and Microsoft declined to say when the operating systems will be identical in these areas.

Projects stumble over barriers

continued from page 2

ing technology manufacturing at Boeing Computer Services Co. in Bellevue, Wash. "It involves breaking down functional barriers and getting groups of people to work together in new, more productive ways. The technology is the easy part."

While CIM promises to boost productivity, reduce inventories and improve product quality and customer service, it first requires companies to change established procedures and rearrange traditional divisions of responsibility, according to users and consultants.

The key to integrating systems is to integrate people first, said Richard Morley, a keynote speaker at the show. Morley is chief executive officer at Flavors Technology, Inc., a manufacturer of data communications equipment in Amherst, N.H.

This means creating work groups comprising people from different areas, such as manufacturing, design and purchasing, to oversee the design and implementation of CIM projects.

"Technology can't be the driver — people must be," Morley said.

But changing established procedures is difficult, especially at companies such as Boeing that have prospered in spite of systems and procedures that aren't integrated, Rutherford said. Most managers don't want to risk changing a system that seems to be working, even though, in the long run, a change might be needed to stay competitive, he added.

Rutherford and other observers recommend that users start with small pilot projects and build on their successes (see graphic, this page).

One manufacturing engineer at Boeing recently gained top management's approval after two years of lobbying to vertically integrate all systems involved in constructing a set of six floor panels for a Boeing 767 aircraft, Rutherford said. The engineer plans to put all design, manufacturing and order entry data on a single system. Currently, this data resides on separate incompatible systems, he said.

Keys to making CIM work

- Focus on people, not technology.
- Focus on integration, not computerization.
- Get top management support.
- Create cross-functional computer-integrated manufacturing planning teams.
- Ensure adequate end-user training.
- Ensure CIM architecture reflects corporate strategy.
- Continually market CIM internally to managers.
- Break the CIM plan into small projects and build on successes.
- Devise performance measures to judge the success of CIM.
- Streamline work processes before automating them.
- Don't limit CIM to the factory floor; consider ways to integrate customers and suppliers.

SOURCE: *NETWORK WORLD*

"If and when this works, management will be eager to expand the concept to other areas and assembly lines to capture the productivity gains," Rutherford said.

Unfortunately, many net managers jump into CIM without fully addressing organizational or strategic issues, said James Weinberg, vice-president at Booz, Allen & Hamilton, Inc. in New York.

Many companies spend lots of money automating sloppy procedures and linking inefficient processes without getting many benefits, Weinberg said.

More importantly, many companies devise CIM architectures without carefully considering their strategic direction and objectives, he said.

Companies need to develop CIM architectures that provide executives and managers with timely information to make decisions that further the company's overall strategic plan and objectives for achieving that plan, Weinberg said. These objectives typically include such goals as achieving higher inventory turns, better quality yields and shorter production lead times, he said.

However, few CIM planners use corporate strategies to frame CIM architectures, Weinberg said. Most have focused on automating the factory floor, thereby creating islands of automation that provide limited and localized benefits.

In addition to up-front planning, companies need to devise training programs to ensure that workers have the skills to operate in a CIM factory, Morley said.

Kenneth Taylor, director of engineering at Warner-Lambert Co. in Lititz, Pa., who is overseeing a five-year CIM implementation project, said his company hired an outside consultant to develop a training program that would educate workers to use automated systems.

"If factory-floor workers aren't trained and haven't bought into the system," Taylor said, "it can be a disaster."

AT&T sets stage for switched T-1

continued from page 1

interest in high-speed switched data services.

"Users will soon start factoring high-speed switched services into their network planning, design and optimization efforts," said Berge Ayvazian, vice-president of communications research and consulting for The Yankee Group, a Boston consultancy.

"They'll decide which sites can be best served with dedicated facilities and which can be cost-effectively served with the switched data services."

To access Accunet Switched 1536, users must be linked to an AT&T point of presence via a T-1 circuit supporting the Integrated Services Digital Network Primary Rate Interface (PRI).

Users also need a T-1 multiplexer or private branch exchange supporting the ISDN Q.931 protocol, which supports transmission of call setup information to the central office via a 64K bit/sec channel on the PRI link. The multiplexer or PBX must have an interface board that supports an ISDN H11 channel, which runs at 1.536M bit/sec.

To set up an Accunet Switched 1536 call, users dial a 700 number from a push-button telephone or microcomputer keypad. The call is routed to a special wideband time slot interchange board in an AT&T 4ESS switch in an AT&T central office, AT&T's Suski said. The board routes the incoming H11 over T-1 links between AT&T central offices.

Firms employing PRI's call-by-call service selection feature could configure their T-1 access link to support Accunet Switched 1536 for a few hours and then reconfigure the PRI channels to support other services, including Megacom and Switched 56.

If AT&T meets its delivery schedule, it will be the first of the big three to offer a switched T-1 service. MCI Communications Corp. in September announced plans to offer switched T-1 service in the third quarter of 1991, and US Sprint Communications Co. has not announced plans for a switched T-1 offering.

AT&T will use its 4ESS network switches to support the service, while MCI will initially use a souped-up version of its Digital Switch Corp. digital access and cross-connect systems with software to support its service.

MCI and US Sprint cannot offer a central office switch-based switched T-1 service because their Northern Telecom, Inc. switches cannot switch data at speeds beyond 64K bit/sec, Ayvazian said.

Steven Taylor, a communications systems consultant with Distributed Networking Associates, a Greensboro, N.C., consultancy, said switched T-1 service will be most popular as a means of backing up existing T-1 links in private networks.

"Companies are employing multiple dedicated T-1s, which are only partially used, as backup for T-1s in their networks," Taylor said. "Switched T-1 would be a less expensive alternative."

"There's a huge pent-up demand for high-bandwidth applications," Ayvazian said. "Users have been waiting for the economics to become favorable."

AT&T said Compression Labs, Inc., a San Jose, Calif., video coder/decoder manufacturer, and a second company it declined to identify are beta-testing Accunet Switched 1536. AT&T plans to demonstrate the service at Communication Network '91 in Washington, D.C. in January and at the International Communications Association conference in Anaheim, Calif., in May.

Unisys adds model to DCP line

continued from page 6

Channel attachment interfaces used to link DCPs to host computers typically take up two to four interface slots, Yamada said.

Unisys claims users can realize a five-year cost savings — the cost of hardware, software and maintenance — of 15% to 40% by using DCP products instead of comparable IBM equipment.

T-1 support

The ILM 20-HS, Unisys' new T-1 interface for DCPs, has four high-speed full-duplex ports and an aggregate data rate of 2.048M bit/sec, enabling it to support European T-1 (E-1). It is the first interface for the DCP family that supports T-1 rates.

While the entire capacity of the interface is required to support a single T-1 or E-1 pipe, at slower speeds it can support a mix of interfaces including V.35, EIA-530 (an updated RS-449), X.21 and RS-232.

The ILM 20-HS takes up one slot in a DCP I/O Module (IOM). The power supply in a single I/O Module can support from eight to 10 ILM 20-HS interfaces if the module is not used to support anything else.

Compatibility

Besides the DCP/25, the ILM 20-HSs can be used on the DCP/30, DCP/35, DCP/50 and DCP/55. The interface is not compatible with the older DCP/15, DCP/20 and DCP/40.

The ILM 20-HS requires use of the Unisys DCP/OS operating system software and a Telecon 8R1 or higher software release.

The DCP/25 and ILM 20-HS are available now. Pricing for the DCP/25 starts at $31,000, and the the four-port ILM interface costs $12,500.

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*Network Protection Capability option not available in all locations.

Users praise superservers

continued from page 1

annually in maintenance costs and software, said Edward Fernstrom, corporate director of MIS at Dyncorp, which provides services such as facilities management to the federal government.

The SystemPros, running Novell, Inc.'s NetWare 386, are each supporting roughly 40 DOS-based workstations on Ethernets for such applications as human resources, payroll, general ledger and accounts receivable.

"We've already migrated about 70% of the company to the SystemPros," Fernstrom said.

Better response time

Users are enjoying dramatically improved response time since the microcomputer servers were installed.

"Reporting is all on-line now," Fernstrom said. "With our large financial systems, many reports required users to submit a job and pick it up the next morning."

Dyncorp selected Compaq's SystemPro over Digital Equipment Corp.'s VAX minicomputers and superservers from NetFRAME, a start-up that introduced the first superserver ("NetFRAME ushers in the superserver era," *NW,* Oct. 2, 1989).

> "Since we are running our core financial systems, we preferred to go with a long-established vendor, such as Compaq."
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The SystemPro costs less and offered greater flexibility than the VAX.

"In a worst case scenario, you can use the SystemPro as a workstation," Fernstrom said.

He said NetFRAME did not win Dyncorp's business in part because it is a start-up company.

"Since we are running our core financial systems, we preferred to go with a long-established vendor, such as Compaq," Fernstrom said.

Another user has taken a different approach to the Compaq vs. NetFRAME evaluation. "We're hedging our bets," said Perry Davis, senior vice-president for information technology at Saatchi & Saatchi Advertising, Inc. in New York. "We're going to go with one of each."

Saatchi & Saatchi's NetWare 386-based superservers are replacing antiquated Novell file servers to support applications such as word processing, spreadsheets and data bases.

The company has already installed the NetFRAME superserver to support 110 users who formerly relied on two Novell servers. The Compaq server has not been installed. Saatchi & Saatchi tested both products for about six weeks each, evaluating strengths and weaknesses.

"Our technicians were more comfortable with the Compaq [server] because it looks like a personal computer," Davis said. "The NetFRAME looked different and felt different; it doesn't have a monitor and it runs under [Microsoft Corp.'s Microsoft] Windows, which we didn't have."

But NetFRAME's server is stronger in remote management, according to Stewart Riegler, manager of technical services at Saatchi & Saatchi. The server can dial out and notify personnel at a remote site, such as a data center, when a fault occurs. Technicians can also dial in to the machine for diagnostics.

"Reliability is a critical issue on these networks," Riegler said. "If the server goes down, we lose a ton of money in productivity and client service."

Compaq is taking steps to provide capabilities similar to those of the NetFRAME server, according to Mike Clark, director of systems engineering for the personal computer vendor.

"I think all systems will provide that very soon because it's a requirement," Clark said. "That's a strong message we've received from customers."

A different role

Some other users are installing superservers to function as multiuser systems.

For example, Leggett & Platt, Inc., a home furnishings component manufacturer in Carthage, Mo., has installed a single SystemPro with two Intel 80386 microprocessors to replace a minicomputer, although the company declined to say which brand of minicomputer was replaced.

Jim Ling, vice-president of staff distributed systems at Leggett & Platt, said the minicomputer had reached its capacity of 35 terminals. By contrast, the SystemPro is supporting 50 asynchronous terminals for a materials requirements planning application. The superserver is running Santa Cruz Operation, Inc.'s SCO Unix.

> "Reliability is a critical issue on these nets. If the server goes down, we lose a ton of money in productivity and client service."
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Ling said the SystemPro offers dramatically improved performance and better response time compared with the minicomputer.

"It's incredible," Ling said. "There is no comparison."

Compaq's server meets the company's goal of 2-sec response time, while minicomputer response times were sometimes in the 15- to 20-sec range.

Precor, Inc., a fitness equipment manufacturer in Bothell, Wash., purchased a SystemPro to support 30 asynchronous terminals, compared with the 16 that were supported on a lower end Compaq microcomputer. The SystemPro is running SCO Unix.

According to Mike Madland, Precor's IS manager, speed has not increased significantly but the company now enjoys greater scalability.

"Performance doesn't drop off as quickly as we add more users," Madland said, adding that the server is running applications including inventory control and purchasing.

Ontario Hydro, a 27,000-employee utility company in Toronto, purchased a NetFRAME server because it was able to meet its stringent performance requirements.

Specifically, the firm sought no more than 10% degradation in end-user response time on a fully loaded LAN, compared with response time that users would enjoy from their local hard disk.

"We used standard benchmark software, and the results looked extremely good," said Thor Miller, senior project specialist in the firm's telecommunications department.

NetFRAME's server is supporting 70 users at Ontario Hydro for such applications as word processing, graphics, spreadsheets and data bases.

NCR adds to LAN Manager

continued from page 6

at $795, and each client license costs $80.

The vendor also announced its NCR SNA Software Distribution Products for OS/2, which is designed to simplify the distribution and maintenance of software in large enterprisewide LANs.

The product allows operating system and application software code to be downloaded across an SNA network to LAN servers and clients. The software includes a component running on an IBM host, as well as communications software for each LAN server and client.

The LAN server component costs $900, the LAN client component costs $250, and the host software is priced at $6,100. NCR SNA Software Distribution Products for OS/2 is scheduled to be available before year end.

Superserver mart growing

LAS VEGAS — Superserver vendors displaying their wares at Comdex/Fall here last week said the machines are quickly gaining acceptance among users as mission-critical application platforms.

Local-area network superservers hit the market about a year ago with product introductions from Compaq Computer Corp. and NetFRAME Systems, Inc. In recent months, AT&T, Digital Equipment Corp. and several smaller vendors have entered the superserver arena, and IBM has announced an Intel Corp. 80486-based server that supports multiple 80486s.

Despite the relative immaturity of the superserver market, Compaq last week said it has sold $200 million worth of its SystemPro superservers in the year since it began shipping. The company declined to disclose unit shipments but said the revenue figure is comparable to sales of its popular Deskpro 386 and Deskpro 386s in their first year of shipment.

> "Users who have a vision of growing the size of their user base over time have an interest in these boxes," said Thomas Arnold.
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John Dunkle, vice-president at Work Group Technologies, Inc. in Hampton, N.H., said worldwide superserver shipments will increase from 36,643 units this year to an estimated 196,434 by 1993. Revenues from sales of superservers will increase from about $1.2 billion to nearly $6 billion during that period.

"Users who have a vision of growing the size of their user base over time have an interest in these boxes," said Thomas Arnold, entry systems vice-president at AT&T Computer Systems in Morristown, N.J.

In addition to supporting growing LAN installations, superservers are being considered for applications that once ran on mainframes, according to Mike Clark, director of systems engineering at Compaq. "Users are coming at it from both directions," Clark said.

Chuck Roush , advisory programmer in LAN planning for IBM, concurred. "I think the sheer power of these servers will enable them to address both ends."

The reliability and performance of superservers will make them attractive platforms for mission-critical applications, said Gene Jurrens, program manager for IBM U.S. Client/Server Computing in Somers, N.Y.

Jurrens cited the example of an auto parts store running an inventory control application on a LAN.

"Without that application, they can't run their business," he said, adding that market research conducted by IBM indicates that a growing number of users are eyeing LANs for mission-critical applications.

Although most companies aren't running such core business applications on LANs, AT&T's Arnold predicted that this will be a trend in the future. "In general, I see users putting them into the heart of their businesses," he said.

But some vendors and analysts said they don't expect LAN superservers to replace mainframes.

"There are 45,000 mainframes in this world. And there will be 45,000 in 10 years," said Frank Dzubeck, president of Communications Networks Architects, Inc. in Washington, D.C., during a Comdex session on client/server computing.

In spite of the growing acceptance of superservers, the machines suffer from a lack of software designed to exploit their multiprocessing capabilities.

"Ninety-one percent of superservers have shipped in a single-processor version," said Work Group's Dunkle.

"If I plug in a superserver today, it's all revved up with no place to go," he said.

IBM's Jurrens agreed. "It's kind of the weak link in the chain," he said. "If you don't have operating system support, it doesn't do you much good."

In addition to the multiprocessing support offered on the Santa Cruz Operation, Inc. SCO Unix, other leading LAN operating system vendors such as Microsoft Corp. and Novell, Inc. are actively working on multiprocessing support, Compaq's Clark said.

In addition, Banyan Systems, Inc. has announced a version of its VINES network operating system designed for a multiprocessor environment.

"All important software is moving in that direction," he said. "Anyone who doesn't move to take advantage of it will be at a competitive disadvantage."

— Tom Smith

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Virtual private nets to augment

continued from page 6

roney said. "But if something goes wrong with the software, the whole network could be affected."

Susan Kalla, director of research for Northern Business Information in New York, agreed. "The biggest buying criterion for a data user is reliability," she said. "Voice is very forgiving, but data is the lifeblood of many of these companies, and it's not forgiving."

The carriers, which have an economic interest in getting users to move from leased lines to usage-sensitive public net offerings, acknowledged that many users are hesitant about moving critical data applications onto the public network.

"I don't think we're going to see a migration of data traffic to virtual data networks as much as we'll see users move toward virtual data networks to complement their existing private networks and add new applications like videoconferencing that wouldn't be affordable over private lines," said George McCusker, product manager for the SDDN option of AT&T's Software-Defined Network.

SDDN is already available at 56K bit/sec and will be generally available at 64K bit/sec next month and at 384K bit/sec during the first quarter of next year, according to AT&T.

Tony Russo, director of data product marketing at MCI, said he wouldn't discount the possibility of some users migrating data traffic completely from private nets to virtual nets, but he noted that users are "going to want to put their toes in the water first."

Hybrid networks will be the norm in the near term, given that many users have made hefty investments in private net equipment and can't afford to abandon it yet. The growth of virtual data nets could parallel the evolution of virtual voice services and may be slower considering the mission-critical nature of many data applications, Russo said.

Bernie Schneider, director of product management at US Sprint Communications Co.'s Sprint Data Group in Kansas City, Mo., said he believes many users will look at virtual data nets as a way to off-load some of the operational duties to carriers so that they can focus on applications critical to their business.

Carriers' emerging virtual data network services will be far more suitable for data applications than existing public data networks, said Schneider, who until recently was head of telecommunications at United Stationers, Inc. in Des Plaines, Ill.

Russo said it will be important for carriers to market their virtual data net services to support specific applications, rather than marketing them just as data pipes. During the first quarter of 1991, MCI will conduct a controlled rollout of the switched T-1 and T-3 services it announced in September to discover what users want from virtual data services, he said.

Among the items that carriers need to fine-tune on virtual data networks is call establishment time, said New York Life Insurance's Maroney, whose company last week signed a $19 million Vnet contract with MCI to move 90% of its voice traffic onto a virtual net.

"It's OK to have an eight- to 10-second setup time for a voice call," he said, "but that's not acceptable in a 3270 environment where you want instantaneous access."

Virtual net providers shift target

continued from page 2

call-screening features but do not rely on the network to do any number conversion to complete calls. The calls are completed as dialed by the user.

Originally, virtual net services were devised as a dial-up alternative to private-line networks, enabling customers to extend features such as extension dialing to remote locations that could not justify a dedicated link to a private backbone. The carrier's switches perform the conversion necessary to transfigure an extension number to a regular 10-digit long-distance number.

With single-site virtual networks, calls are simply sent over the carrier's network as a regular long-distance call but are billed at virtual net rates. Usage accrued is measured under generous volume discount schedules.

AT&T began the push to make virtual networks available to a wide range of users by eliminating its minimum on-net traffic requirement for its Software Defined Network (SDN) service in June 1988. MCI Communications Corp. followed suit earlier this year, and US Sprint Communications Co. created a low-end version of its Virtual Private Network (VPN) service in June, which carries no on-net calling minimums.

"What the carriers are doing is taking virtual network services down market to smaller and smaller businesses," said Page Montgomery, vice-president with Economics & Technology, Inc., a tariff analysis and network design firm in Boston. "There are quite a few one-site [organizations] that do a good deal of outbound calling within the U.S. and around the world."

Glenn Starr, SDN product manager for AT&T, said single-site SDNs "have caught on in a big way with colleges and universities." AT&T currently provides single-site SDNs to between 20 and 40 schools, and expects the arrangements to become equally popular in the health care industry.

Other virtual net product managers said they began selling virtual nets to one-site users with some reluctance. "We'd prefer not to offer Vnet to [single-site] WATS customers. That's not what the service was intended for," said Allan Palmer, Vnet product manager for MCI. "Vnet is not our highest profit margin service, but Vnet accounts are the largest in minutes of use. When AT&T started taking SDN down market to one-site users, how could we not do the same?" he asked.

William Lerand, VPN product manager for US Sprint, said selling VPN to one-site users was an anticipated outgrowth of the carrier's decision to offer Option 1, a new version of VPN for midsize and small users.

"Our WATS customers were being pitched SDN and Vnet, and we were saying stick with WATS," Lerand recalled. "They asked, 'Why stay with WATS?' and we said, 'Because it costs less.' They said, 'No, it doesn't.' "

"We were aware [that] single-site users could start asking for VPN, but it isn't a situation we're real happy with," Lerand said. "We tend to discourage it to a degree." The cost of providing, creating, supporting and managing one-site virtual networks is high.

Nevertheless, virtual network services are some of the most cost-effective services available today.

"The single-site Vnet is the most cost-effective arrangement on the street for users that spend at least $30,000 a month on long-distance service," said Wayne Wood, the MCI major account executive that closed the deal with Opryland.

Opryland is using Vnet's authorization codes to regulate calling privileges. About 3,800 full-time Opryland employees and guests at the 406-acre entertainment, broadcasting and hospitality facility place 1.6 million calls from the complex each year. The Vnet will carry 380,000 minutes a month.

Vanderbilt University, also in Nashville, signed a contract for a single-site Vnet with MCI in the summer of 1989. "The carriers have structured their [virtual network] tariffs such that [dedicated access] to off-net rates are lower than WATS rates," said Donald Corcoran, telecommunications manager for Vanderbilt.

"There's quite a bit of interest in one-site virtual networks among colleges and universities," Corcoran said. "I have yet to find any reason why a single-site [user] would not want to move from WATS to a virtual network." MCI carries the majority of the school's outbound calling traffic.

MCI will trim 1,500 jobs

continued from page 2

regions closer to the chief marketing officer," said Berge Ayvazian, vice-president at The Yankee Group, a consultancy in Boston.

"This will allow customer needs to be passed on to MCI's marketing organization more quickly and give MCI the ability to make changes that can be passed out to customers more rapidly," he said.

An MCI spokesman said the restructuring, which could result in layoffs and relocations of more than 6% of MCI's 24,000-person work force, will have "no direct impact on customers."

Users contacted by *Network World* said it is too early to determine the full impact of the changes.

Market analysts, however, said users are destined to be affected during the transition, when some of their regular contacts at MCI will be relocated or laid off.

"Realistically, customers will be affected when this kind of an upheaval is made," said Daniel Briere, president of TeleChoice, Inc., a Montclair, N.J., telecommunications consultancy. "The person at MCI who the customer might have called before might not be there anymore, and that could be frustrating. But in the long run, MCI's work force will operate more efficiently, and that's positive for the customer."

MCI is already a lean company, Briere said, but the company does have some fat to trim in sales and administration, largely as a result of its recent acquisition of Telecom*USA, Inc.

MCI sources said the Telecom*USA acquisition bloated the company's sales force by about 15%.

The worsening economy and AT&T's increasingly aggressive marketing efforts also made it critical for MCI to improve its operating efficiencies, analysts said.

Rivals AT&T and US Sprint Communications Co. have previously announced similar restructurings to improve operating costs and better meet customer needs.

The competitive marketplace in which MCI operates requires "a new market-driven organization structure," said Bert Roberts Jr., MCI's president and chief operating officer.

He said the changes will put negative constraints on the company's financials during the next several quarters but declined to be more specific.

MCI's stock last Thursday dropped about $1.88 to $30 in heavy trading as word leaked out about the reorganization and because of what MCI officials described as false rumors that MCI Chairman William McGowan would retire.

Calendar

Nov. 27-28, Cambridge, Mass. — Client Server Computing: The Impact. Contact: Forrester Research, Inc., 185 Alewife Brook Pkwy., Cambridge, Mass. 02138; (617) 497-7090.

Nov. 27-29, Newark, N.J. — Telecommunications Infrastructure Planning. Contact: Washington State University, Conferences and Institutes, College of Engineering and Architecture, Pullman, Wash. 99164-2712; (509) 335-7225.

Nov. 27-30, Crystal City, Va. — OSI III; The Interoperability Advantage. Contact: Phillips Publishing, Inc., 7811 Montrose Road, Potomac, Md. 20854; (800) 722-9120.

Nov. 28-29, Monterey, Calif. — The 1990 LAN-Based Facsimile Conference. Contact: BIS CAP International, P.O. Box 68, Newtonville, Mass. 02160; (800) 874-9980.

Dec. 2-5, San Diego — Globecom '90. Contact: Nomi Feldman, Institute of Electrical and Electronics Engineers, Inc., Suite 110, 5665 Oberlin Drive, San Diego, Calif. 92121; (619) 453-6222.

Dec. 3-5, Washington, D.C. — 22nd National EDI Systems Conference & Exhibit. Contact: Conference Registrar, The Electronic Data Interchange Association, Suite 550, 225 Reinekers Lane, Alexandria, Va. 22314; (703) 838-8042.

Dec. 3-7, Los Angeles — Automatic Object Recognition Systems. Contact: University of California, Los Angeles Extension, Division of Engineering, Suite 530, 10995 LeConte Ave., Los Angeles, Calif. 90024; (213) 825-1047.

Dec. 3-9, Harare, Zimbabwe — Africa Telecom 90. Contact: International Telecommunication Union, Africa Telecom 90 Secretariat, Place des Nations, CH-1211 Geneve 20, Switzerland; 41-22-730-5244.

Dec. 13-14, Orlando, Fla. — Information Networking. Contact: National Engineering Consortium, Suite 740, 303 E. Wacker Drive, Chicago, Ill. 60601; (312) 938-3500.

U.K. plans for wide-open arena

continued from page 1

ture from the country's existing "duopoly" system, which permits competition between only two carriers, British Telecommunications PLC and Mercury Communications, Ltd.

The changes would also increase pressure on other European countries to open up net markets (see "EC OKs lift of satellite net restrictions," this page).

"Users here are euphoric," said Adrian Squires, public telephone operator liaison director with the Telecommunications Managers Association, a leading U.K. user group.

Janice Obuchowski, assistant secretary for communications and information at the National Telecommunications and Information Association in Washington, D.C., said, "I think it puts the U.K. in a very good position that's going to make it difficult for other countries that try to restrict competition."

The proposals are outlined in the position paper titled "Competition and Choice: Telecommunications Policy for the 1990s." The proposed changes will be open for public comment through Jan. 14.

Although modifications could be made, observers expect most of the reforms to be adopted as originally proposed.

In many respects, the proposed reforms would make the U.K. telecommunications market even more liberal than the U.S. market.

For example, the U.K. is calling for full local-loop competition. In contrast, most U.S. states give local carriers a monopoly over public switched telephone services.

Also, the U.K. says it will maintain no foreign ownership restrictions; the U.S. restricts foreign ownership of U.S. carriers that use microwave, satellite or cellular radio facilities to provide network service.

International boon

Several of the proposed changes would be particularly beneficial for international network users. For example, dropping restrictions on two-way satellite nets would enable users, for the first time, to run privately owned very small aperture terminal satellite nets between the U.S. and U.K.

In addition, international resellers would be able to offer switched services between the U.S. and U.K. at prices up to 50% less than those now available, according to Leonard Elfenbein, president of Lynx Technologies, Inc., a consulting company in Little Falls, N.J., that specializes in international communications.

Domestic front

On the U.K.'s domestic front, the establishment of new equal access rules could be a boon to alternative long-haul carriers.

British Telecom now controls the bulk of the U.K.'s local-loop facilities, forcing users in most areas to dial extra digits to access other long-distance networks via British Telecom's local net.

Rules allowing cable television companies to become carriers could transform the international marketplace by making U.S. regional Bell holding companies major service providers in the U.K.

Today, about 90% of all British cable television licenses are owned by the RBHCs, including Nynex Corp. and US West, Inc., according to Richard Hooper, head of the information industry consulting practice at PA Consulting Group, Ltd. in London.

Hooper said the RBHCs will probably use these licenses to start up major new local net operations in the U.K..

EC OKs lift of satellite net restrictions

BRUSSELS, Belgium — As expected, the European Commission last week approved a major position paper calling for the elimination of restrictions on the sale and operation of pan-European satellite networks.

If the changes proposed in the green paper on satellite services are adopted, users would be able to deploy private, pan-European satellite networks as an alternative to terrestrial facilities.

Currently, most Common Market countries prohibit the use of private two-way satellite nets, which many users see as an attractive alternative to the disparate terrestrial facilities offered by Europe's national carriers ("EC to call for easing of satellite net rules," *NW,* Nov. 5).

The "Green Paper on a Common Approach in the Field of Satellite Communications in the European Community" begins the movement toward legalization of private satellite nets by laying out the major reforms the European Commission plans to implement over the next few years.

The green paper calls for the 12 Common Market countries to eliminate carrier monopolies on the provision of satellite services.

The paper also calls for the European Commission to eliminate restrictions on the operation of two-way satellite networks and for users to bargain directly with satellite operators for transponder capacity.

The green paper also proposes that the Paris-based European Telecommunications Satellite Organization, which controls most of Europe's satellites, be allowed to sell satellite services directly to users, rather than being forced to work through monopoly carriers.

— Barton Crockett

FCC divided on Tariff 12

continued from page 1

Service packages and another package no longer purchased by anyone — existed when the Federal Communications Commission issued its Tariff 12 order. Thus, the recent appeals court reversal of the FCC's Tariff 12 ruling technically applied only to those packages.

But some FCC officials and staffers strongly oppose this tactic. They say the FCC's superficial treatment of Tariff 12 issues resulted in the appeals court reversal and that trying to sweep the problem under the rug is sure to land the agency back in court, inciting the judges' anger.

These staffers are pushing colleagues to take whatever steps are necessary — including modifying Tariff 12 — to resolve legal questions about the custom network deals once and for all.

"I don't think there's going to be a lot of sympathy [among some of the commissioners] for anything that looks like sandbagging," said one commissioner's aide who requested anonymity. "I think we're going to say, 'Let's take the bull by the horns, figure out what needs to be done and do it.' "

Sources at the agency said a plan for handling the investigation could be distributed to FCC commissioners as early as this week, but a final proposal probably won't be issued publicly until December.

After that, the involved parties will have several months to comment on the FCC proposal, pushing the resolution of Tariff 12 into next spring at the earliest.

Tariff 12 deals were plunged into legal uncertainty last month when a federal appeals court overturned the FCC's decision allowing AT&T to offer the custom net deals. The court said the FCC had considered improper factors when it approved Tariff 12 packages.

The court was also highly critical of the FCC for deciding the case on very narrow grounds and leaving numerous legal issues unresolved. Among the unanswered questions were whether Tariff 12 packages could be resold and whether price differences among various Tariff 12 deals could be justified.

> "We'll say, 'Let's take the bull by the horns, figure out what needs to be done and do it.' "
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"It is one thing for the FCC to decline to investigate a tariff," the court said. "It is quite another to note the importance of a question concerning a tariff, request and take evidence from the parties, hold a hearing on the matter and then change its mind, wiping out the hearing as though it had never occurred."

Observers say the agency's mandate under the Communications Act of 1934 and the somewhat ambiguous language of the court's ruling give the FCC some latitude in dealing with Tariff 12.

If the FCC takes the narrowest view in its investigation, some say it will be much easier to reach a favorable decision on Tariff 12.

For example, the FCC must determine whether price differences among packages are justified. It would be easier to justify differences among five packages, which are relatively different in content, than 77 packages, some of which closely resemble one another.

But the FCC will face a major problem if it adopts this strategy. The court has already announced its displeasure with the way the FCC previously handled the decision, and another ruling that skims the surface of the Tariff 12 issue could incur the wrath of the court, some FCC sources say.

"You can't go into court and make that argument without putting a bag on your head," an FCC staffer said.

However, if the FCC digs deeply into Tariff 12, it might not be able to justify the deals, observers claim. The offers may have to be modified and that, undoubtedly, will incur the wrath of some users.

One modification that was discussed in the FCC's first investigation of Tariff 12 and has resurfaced is for AT&T to establish a pricing matrix.

The matrix would provide a continuum of prices based on traffic volume and other factors for services purchased under Tariff 12. This would eliminate big price differences between Tariff 12 packages and weaken opponents' arguments that AT&T is discriminating among users.

Philip Verdi, executive vice-president of electronic services at MasterCard International, Inc., an early Tariff 12 user, said he would be opposed to a pricing matrix.

"[That would] move us to a society that's similar to Russia rather than a competitive society," Verdi said. "I really believe that you've got to keep [Tariff 12] wide open, and it's every man for himself. You negotiate the best deal that you can," he said.

Stanley Welland, manager of corporate telecommunications at General Electric Co., said that if a pricing matrix was the only way to keep Tariff 12 on the books, he would consider it, though not with great relish.

"If another mechanism is going to be created, certainly I'd look at it," he said. "But I don't know if I'd like it or not."

Welland said he has not studied other Tariff 12 deals and doesn't know whether bringing all the plans in line would raise or lower his rates.

NETWORK WORLD

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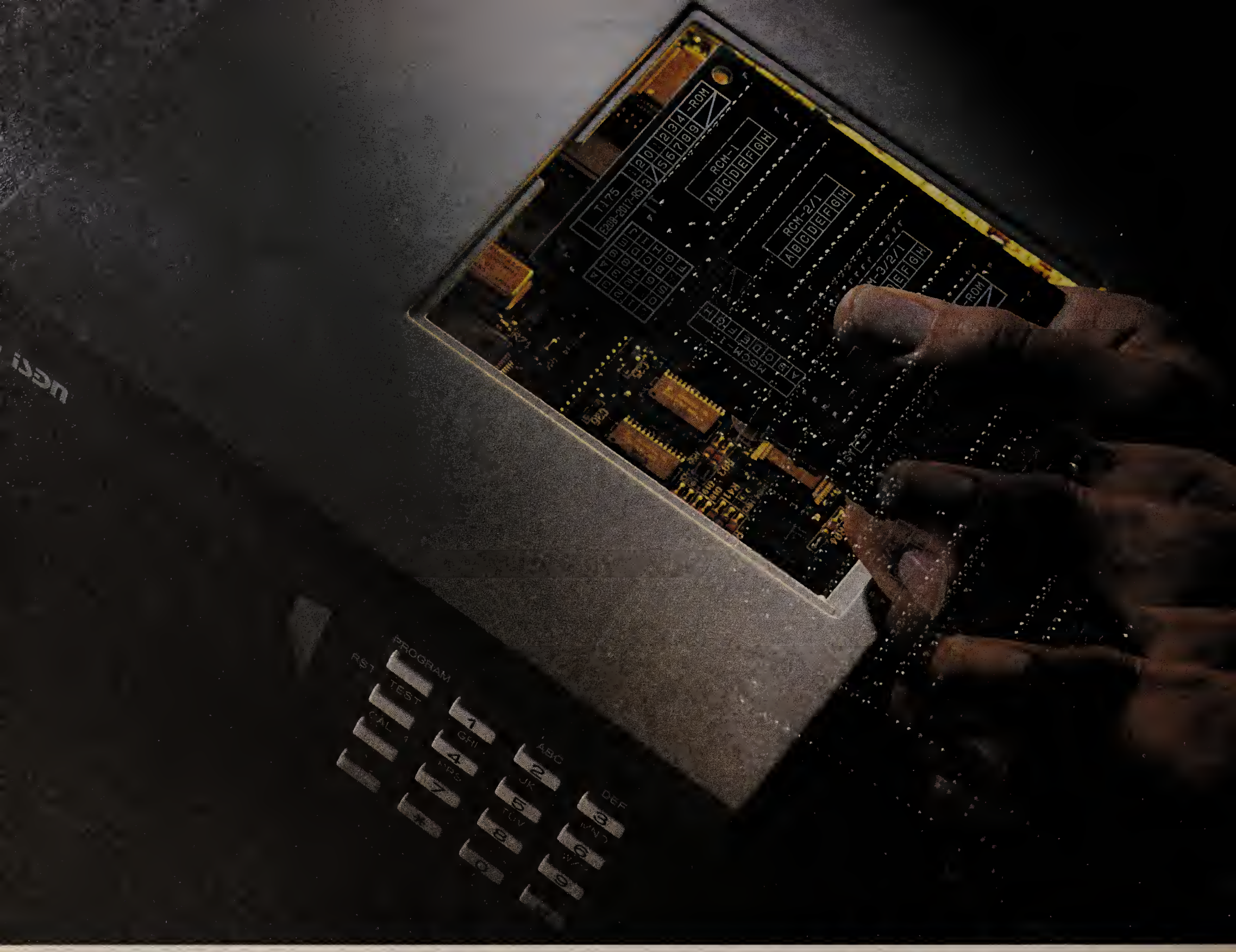

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See The FAXNeT Form on Page 33

INTERNATIONAL
COMMUNICATIONS
ASSOCIATION

NETWORK WORLD
The Newsweekly of User Networking Strategies

Dear *Network World* reader:

Attached to the front of this week's issue, you'll find an entry form for the International Communications Association/*Network World* Call for Innovation program. We hope you'll take advantage of this opportunity to participate in this exciting program designed to recognize network professionals for their innovative work.

Through the Call for Innovation, the ICA and *Network World* honor communications professionals within the user community for the creative application of network technology to solve problems and create new business opportunities.

Call for Innovation is your forum for sharing with your peers the innovative network solutions you've developed. Users who are recognized for their extraordinary work will present their projects to the ICA membership and other communications professionals during a special feature session June 5, 1991 at the ICA conference in Anaheim, Calif. ICA will also publish a journal of all qualified papers, and presentations will be considered for publication in ICA's award-winning *Communique'*, a publication that reaches network executives in nine countries.

This year, the Call for Innovation program has been expanded to include network professionals in any user company. Take a few minutes to fill out the attached entry form, which is also a prepaid mailer. If the form is missing, call *Network World* at (800) 622-1108 or ICA at (800) ICA-INFO for details.

Don't delay. Get into the running today for the Fifth Annual Call for Innovation program. All entries must be received by Dec. 28, 1990.

Sincerely,

Dennis Krysmalski

Dennis Krysmalski
Chairman, ICA Call for Innovation program

John Gallant
Editor/*Network World*

Call For Innovation

ISDN Plug n' Play

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NETWORK PROFESSIONALS: DON'T MISS OUT!

INTERNATIONAL COMMUNICATIONS ASSOCIATION and NETWORK WORLD The Newsweekly of User Networking Strategies

present the fifth annual

Call For Innovation

Network professionals with user companies

Get the recognition you deserve for your innovative applications of network technology:

Enter the International Communications Association/*Network World* Call for Innovation!

Through the Call for Innovation, the *International Communications Association* and *Network World* honor communications professionals within the user community for the creative application of network technology to solve problems and create new business opportunities.

The Call for Innovation is your forum for sharing with peers innovative network solutions you've developed. Communications professionals who are recognized for their extraordinary work will have the opportunity to present their projects to the ICA membership and other network professionals at a featured session during the ICA 1991 conference to be held June 2 - 7 in Anaheim, Calif.

The ICA will publish a journal of all qualified Call for Innovation papers. Presentations will also be considered for publication in ICA's award-winning *Communique'* , a publication that reaches communications executives in nine countries. In addition, Call for Innovation participants will be able to share experiences with peers in a one-on-one setting on the exposition floor during special "Poster Sessions" at the ICA conference. **All entries must be received by December 28, 1990.**

How does it work?

Submit a 150- to 250-word abstract describing your work in one of the following categories.

1. An innovative application of communications technology to solve a problem or gain a competitive advantage.

2. Work you've undertaken with a vendor to develop a new product or service needed by your company.

3. Actions taken by your company that had a material influence on the standards-setting or regulatory process.

4. Original research conducted in your organization that resulted in new applications for technology.

1. Name _____ Address _____

Title _____ _____

Company _____ Tel. No.: _____

2. Abstract (Additional space on reverse)

_____

_____

_____

_____

_____

_____

Please write or type your abstract in the space provided above and drop this prepaid mailer into the mail. You may also fax your submission to *Network World* at (508) 820-3467. Please be sure to fill out your name, title, address and telephone number. If you qualify, you will be contacted by a representative of ICA or *Network World* for additional information. **All entries must be received by December 28, 1990.**

Past Call for Innovation Winners

1987

Harry E. Lafoe, Jr.
Marathon Oil Co.

•

Robert E. Harrold and
Michael P. Spillane
First Wisconsin National Bank

•

Ryan S. James
United Technologies Corp.

1988

Roger C. Benson
Eastman Kodak Co.

•

Kevin J. Conlin and
Harry Alcoba
Harris Corp.

•

David M. Nevers
United Airlines

1989

Donald C. Augustin
and Cheryl Diller
McDonnell Douglas Corp.

•

R. Stephen Blaney and
James J. Sobszak
Westinghouse Electric Co.

•

H. Glen Runyon
McDermott International, Inc.

1990

Dr. Raymond K. Neff
Case Western Reserve University

•

Steven Levy and
Edmond Zaharewicz,
Putnam Companies

•

John Crankshaw
SteelCase, Inc.

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